

# RAILROAD GAZETTE

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## SNOW PLOW.

The accompanying engraving shows a lately devised form of snow plow in which the inventor has displayed considerable ingenuity and an intimate acquaintance with the difficulties which very often attend the working of those machines. Travelers and train men, who have waited impatiently for indefinite, and usually too long, periods for laborers with shovels to clear away impenetrable drifts, will be particularly apt in seeing the advantages of a plow which will not bank up the snow ahead of it, which will not get "stuck" and which, in the way of shoveling, can perform more rapid work than any number of laborers that could be crowded into the cut.

That part of this invention which might be called the ploughshare consists of a double-leaved rectangular platform, inclined at an angle of about 20° to the horizontal. The center of this platform is pivoted transversely to the forward end of the locomotive truck so that by turning the crank, shown near the rear of the platform, the platform is revolved to a horizontal position, such power being secured by the intervening toothed wheels and knee joint that no weight of snow which can rest on the platform can prevent its revolution.

The two leaves of the platform are hinged at the outside edges, and connected by a two-branched chain passing over a pulley placed in the top of a pillar above the floor of the plow truck, with a windlass beneath the floor, which is fixed on a shaft bearing a toothed wheel, that may be slid into gear with a toothed pinion on the front axle of the locomotive. The whole may be thrown into gear by the operator, by means of the lever shown on the right hand of the truck, when the leaves will unfold and dump their load on each side of the track.

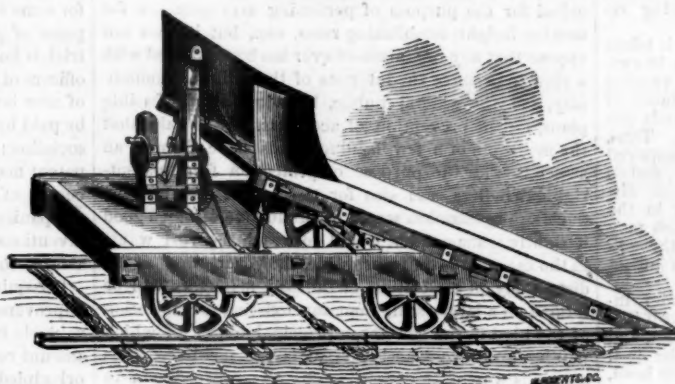
It is expected that this plow will operate as effectively as the ordinary snow plow up to that point where the train is brought to a standstill by the banking up of snow in the cut before the locomotive. Then a man is stationed on the platform; the crank is turned, bringing the plow to a horizontal position; the locomotive is backed out of the cut, and, at the proper point, the lever is drawn back, throwing the toothed wheel into gear so as to relieve the platform of its burden. This operation can be repeated very rapidly, until the track is sufficiently clear to proceed.

Mr. Thomas L. Shaw, of Omaha, Nebraska, is the inventor.

—A correspondent of the New York Tribune, writing from the city of Mexico says of the proposed railroad and canal across the isthmus of Tehuantepec: "The railway will be of vast importance, but the canal to communicate the Pacific with the Atlantic will be a work of utility for all mankind, and is especially required for the development of American interests. All reports concur in favoring the practicability of the railway, and also of the Inter-oceanic Canal. The harbors are good, the climate healthy; magnificent country, comparatively few natural obstacles, and plenty of water for the canal. In this country there has long existed a wide-spread desire for the execution of the two important works above named, which, of course, will operate powerfully to promote our material prosperity."

## STANDARD RAIL SECTIONS.

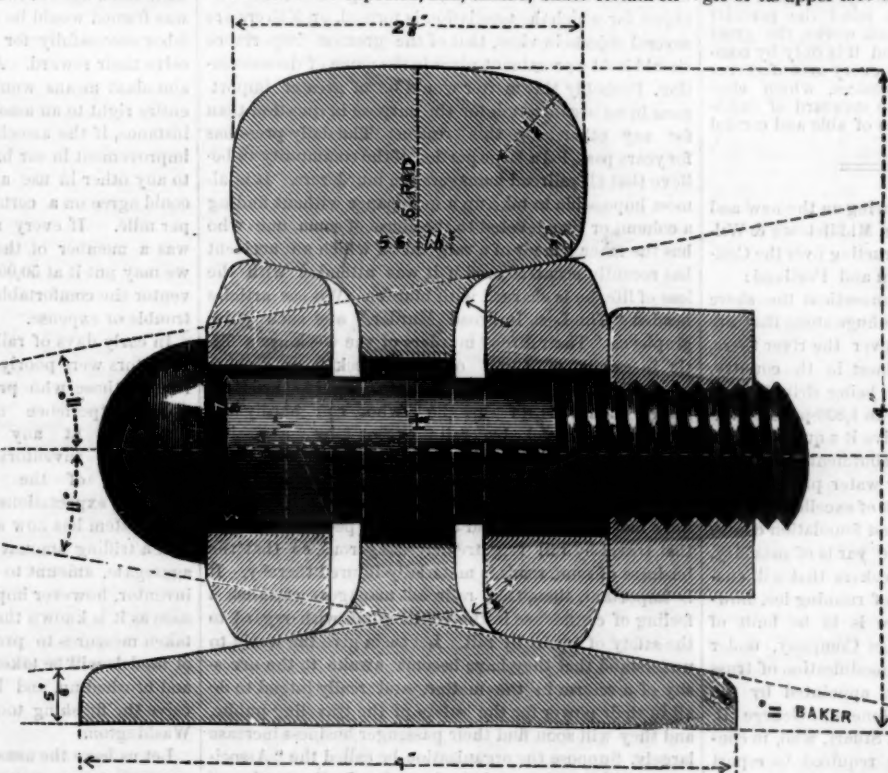
If it were possible to design a small series of standard rail sections, varying in weight from 35 lb. or 40 lb. per yard, for the light narrow-gauge railways of branch or secondary lines, increasing to 85 lb. per yard, required to withstand the heavy and continuous traffic of a great main line, and if it were possible to convince engineers of the advantages to be derived from the general adop-



Shaw's Snow Plow.

tion of such uniform sections, a great benefit would be conferred alike upon railway companies, rail makers, and the public.

It is not to be expected, and, indeed, under certain cir-



Standard Rail Sections.

cumstances, it may not be advisable, that such a system should be universally introduced; but it is clear that its gradual adoption would lead to the manufacture of a more uniform quality of rail, the characteristics of which could be more certainly known; it would lead to a cheaper production, and it would enable engineers to employ a standard specification, and to subject the rails to a standard test.

It is scarcely necessary to point out the great inconveniences that inevitably result from the vast numbers of different sections that are now in use; almost every engineer has one of his own, which, however slight it may differ from that of others, involves for its construction new rolls—of themselves a small matter, but which

incurs considerable delay in the execution of the order, often an affair of considerable importance. And though the absolute cost of a new set of rolls is but a trifle, it is sufficient to add sensibly to the price of rails, when a small order is given, as is especially the case with American railways, where the requirements are frequently under 1,000 tons.

Mr. C. P. Sandberg, the inspector in this country for the Swedish and Norwegian Government railways, has for some time, and with considerable success, devoted his attention to this subject, and a short time since he published a series of standard rail sections, ranging from 40 to 80 lb. per yard, designed so as to meet the requirements of traffic in the most satisfactory manner, and at the same time to afford special facilities to the manufacturer. A leading principle in setting out these sections is that the height of the rail corresponds exactly with the width of its bottom flange, which is made 3½ inches broad for a 40 lb. rail, while the weight is increased by 5 lb. per yard for every quarter of an inch in the width and height, and the size of the head is made of such an increasing proportion as to allow of half an inch wear in each case. By adopting this proportion the range for width of flange and depth of rail extends from 3¼ inches to 5¼ inches for an 80 lb. rail, and the following general particulars refer to all the sections. The flange is not made less than 5-16 of an inch thick, and the angle of its upper face with the under side is 11°, the under

side of the head having a similar inclination, so that the fish-plate may be reversible; the lower corners of the head are made with curves ¼ inch radius; the top table is curved with a 6 inch radius, and others of ¼ inch connect the top with the sides of the head. The width of the head is made 1½ inches for the 40 lb. rail, increasing to 2½ inches for that of 80 lb.; while the depth increases from ½ of an inch in the former to 1¼ inches in the latter. It is satisfactory to note that Mr. Sandberg's proposition has met with a favorable reception, and that in nearly all the Welsh mills orders have been fulfilled, or are in course of execution, for the 50 lb. and 55 lb. section.

The accompanying sketch shows the adaptation of the type to the most common weight of American rail, that is, 56 lb. to the yard, the section being similar in all respects to the standard 55 lb. rail, except that a trifling increase of thickness has been given to the web, which is made 9-16 of an inch instead of ¼ inch. From the drawing it will at once be seen that the section is one likely to

find favor with rail makers, being easily rolled, while the broad flange, the stiffness of the fish-plates, and the depth of the head recommend it as a steady and enduring rail.

Connected with the subject of efficient rail making is the important one of efficient rail inspection, and here again we must refer to what Mr. Sandberg has done in this direction. It cannot be doubted that thorough inspection is calculated to benefit the purchasers, while to the manufacturers it is a positive advantage when fairly and properly pursued, and it must be admitted that for want of proper inspection thousands and thousands of tons of rails have left our mills, which have brought our makers into disrepute and damaged the foreign business.



Especially from America complaints have been loud, and too often but well founded, while the gradually increasing manufacture of rails in the United States indicates the dissatisfaction with which English rails are regarded. It was not so once, when the permanent way exported from this country to America was infinitely superior to anything that could be produced there, and to this day such rails, worn out, command high prices for re-rolling. Of course competition, and the desire of obtaining cheap materials, together with the urgent necessity of getting large orders hurriedly out of hand, have brought about this undesirable state of things. But one of the principal causes is the lack of proper inspection. If we turn, however, to the best practice of engineers in this matter, we find that Mr. Sandberg, at all events, has introduced a most satisfactory system. Let us take, for instance, the inspection of a lot of first-class iron rails, say 600 tons, weighing 55 lb. to the yard, which we assume to have been piled and rolled in the best manner, as follows: The top slab would be made from puddled bars, or puddled balls, doubled up into a bloom raised up to welding heat, and rolled into a slab 7 inches by 2 inches. If the puddled bars are employed, they would be piled so as to break joints, be twice heated and rolled for the weight of 55 lb. per yard. In either case the slab, when broken, must show perfect welding. With regard to the rail pile, the arrangement is left to the option of the maker, except as regards the two upper layers next the top slab, which must be of puddled bars. The pile they made would be heated and bloomed either under hammers, or between rollers, and on being reheated would be rolled into its exact form.

Of the rails thus made, one out of every 1,000 is taken for testing, and placed upon 4 feet bearings. A 10-cwt. ball is then dropped upon the rail from a height varying in proportion to the weight of the rail, the distance of fall in feet being the weight of the rails in pounds per yard, divided by the weight of the ball in cwt. Thus, with a half ton weight a 4 feet fall would be required for a 40 lb. rail, a 6 feet 6 inch fall for a 65 lb. rail, and so on. If the weight of the ball be less, of course the distance of fall must be increased, though hardly in the same proportion, for it is obvious that a rail which may withstand the shock of a heavier body falling through the shorter distance, may yield under the sudden impact of a lighter weight with a longer drop.

If the rail selected for test out of the 1,000 under inspection is not broken, the whole are passed; but if it is fractured then ten rails are taken from the same lot, and 90 are passed for each one of those that pass the test. The fractures must show perfect welding in the head, and in the different wearing parts of the rail.

With such trials as these, a careful inspector and a minute tabulated record of the tests, the most satisfactory results can be obtained, and a comparison instituted between the productions of one mill and those of another. We need hardly say that the result differs very widely. Thus, in half a dozen fulfilled orders from different makers the percentages of rails rejected had varied from 25 to 50 per cent. Bearing in mind the peculiar facilities or drawbacks attending each works, the great difference may be accounted for, and it is only by comparing the results, and urging upon every manufacturer the necessity of observing the practices, which elsewhere produce better rails, that the standard of excellence can be raised by the assistance of able and careful inspectors.—*Engineering.*

#### The Middletown Bridge.

The Boston Post has the following on the new and novel bridge which the New Haven, Middletown & Wilmantic Railroad Company is constructing over the Connecticut River, between Middletown and Portland:

"On the Portland side of the Connecticut the shore is busy with men working upon the huge stone that are to make the piers for the bridge over the river there, which engineers say will be the finest in the country. For the foundations, 4,000 piles are being driven, each one being driven to that depth that an 1,800-pound hammer falling thirty feet would not drive it a quarter of an inch. The masonry consists of an abutment and pier of 50 feet span on each shore, and four water piers, besides the pivot and two rest piers, all built of excellent quality of granite quarried near by. The first foundation course of the pivot pier contains 200 cubic yards of masonry, and all the piers have heavy ice-breakers that will enable them to withstand any shock of running ice, however powerful. The superstructure is to be built of wrought iron by the Keystone Bridge Company, under the patent of J. H. Linville, with a modification of truss suggested by a board of engineers appointed by the State Legislature, consisting of Generals George B. McClellan, Q. A. Gilmore and C. B. Stuart, who, in consultation with General Serrell, are required to report their decisions regarding location, grade, materials and manner of construction to the Superior Court. There are to be four spans of 200 feet each, two of 50 feet, two spans at pivot pier of 152 feet on each side, making over 300 feet of connected truss, and leaving 185 feet clear water way on each side of centre. The grade is 38 feet above low water and 10 feet above the highest freshet ever known on the river. C. C. Campbell & Co., of New York, are doing all the masonry for the bridge, and the work is rapidly pushed forward."

—The United States Trust Company of New York has received the list of the stockholders of the Union Pacific Railroad Company, and on the arrival of the new certificates the stock will be immediately called at the regular Board of the New York Stock Exchange.

## Contributions.

### ASSOCIATION OF RAILROAD OFFICERS FOR THE PREVENTION OF ACCIDENTS.

BY WM. S. HUNTINGTON.

Associations seem to be the order of the day, and, judging from the interest manifested by those who are connected with these organizations, there is much benefit to be derived from them. There is hardly any branch of industry, art, or science, but has its association. Engineers and mechanics, and mercantile and scientific men have their associations, and the news-boys and boot-blacks have theirs and are, no doubt, benefited thereby. Some of these associations are of no special benefit to any but the members thereof, while others, if properly conducted, are beneficial to the public at large, and it is for the interest of the public to aid and encourage all such associations as have a worthy object in view. Such an one most assuredly would be an association of railroad superintendents for the prevention of accidents. There have been one or two conventions of railroad superintendents and masters of transportation called for the purpose of perfecting arrangements for moving freight, establishing rates, etc., but it does not appear that any organization ever has been effected with a view to promote the interests of the railroad community, and the general public, by adopting all feasible plans, for the prevention of accidents. It is said that the managers of a few leading roads have formed an association for the purpose of protection from patent-right swindlers, and also for the benefit of inventors. Such an organization would be productive of much good if rightly managed, but it will not reach the real wants in the case. It is quite probable, however, that at no distant day an association of railroad managers will be formed on a larger scale than any existing organization of the kind in the country, a principal object of which will be to prevent accidents as far as possible. This matter is worthy the attention of every railroad man in the country, and with a view to aid as much as possible, any effort that may be made in this direction, I propose to offer a few hints on the subject.

In the formation of an association it is important that it be organized under a proper name. A name should be selected that will indicate, so far as possible, the real object for which the association is formed, or, if there are several objects in view, that of the greatest importance should hold a prominent place in the name of the association. Probably this matter would be of greater importance in an organization for the purpose in question than for any other, for this reason: The daily press has for years past, led a large portion of the community to believe that all railroad managers are murderers. It is almost impossible to take up a newspaper without finding a column or two devoted to the abuse of some one who has the management of a railroad on which an accident has recently occurred, and if it was attended with the loss of life, he is charged with murder. We see articles headed "The Last Railroad Murder," and such paragraphs as "The railroad murders of the week are a little in excess of those of last week," or "there is a slight falling off" etc., etc. There are actually thousands of people who can hardly be induced to travel by rail except by necessity. In wealthy and populous portions of the country no inconsiderable share of the passenger business is pleasure travel, and these newspaper articles have had the effect to lead this class of people to believe that travel by rail is extremely dangerous, so that the business of some roads is materially injured thereby. It is important, then, that railroad managers establish a feeling of confidence in the public mind, with regard to the safety of travel by rail. Let them give the world to understand that they have become awake to the necessity of a reform in the matter, and really intend to do all in their power for the safety of the traveling public, and they will soon find their passenger business increase largely. Suppose the organization be called the "Association of Railroad Superintendents for the Prevention of Accidents." This would tend to establish confidence, and also the belief that these railroad men are not such terrible destroyers of human life after all. Such an association need not be confined to this matter of accidents alone, but its scope could be extended so as to include other matters of interest to railroad men. After the organization of the association, the first question will be, What can be done to prevent those accidents, and how are we going at work to do it? With the exception of such accidents as are unavoidable, the way is clear, and all that is necessary to be done, on the part of the association, is to make their wants known to inventors, and every mechanical appliance needed as measures of safety will be produced. As the prevention of a large share of railroad accidents can only be

effected through the assistance of inventors and mechanics, it is obvious that the railroad management must adopt a more liberal policy toward those than has been practiced heretofore. There are hundreds of ingenious men all through the country who have models of all manner of improvements, hid away in their tool chests or in closets where they are covered with dust and cobwebs. Many of these contrivances would be of great value to railroad men if brought into use, but the inventors are waiting patiently for an opportunity to get their improvements before the public without being beset by pirates. Let the association provide means for testing all kinds of improvements needed and inform inventors that any valuable improvement, or any that may seem valuable, will be tested at their expense and if satisfactory will be paid for. This arrangement would be beneficial to railroad companies as well as inventors, for the reason that many inventors have no means of giving their improvements a practical test, and they are deprived of all opportunities of realizing anything for their labor, and the companies are subjected to the inconvenience and expense attending the want of these inventions. Railroad companies are often the losers by paying for some apparently valuable improvement and the expense of putting it in operation, which, after a thorough trial, is found of little value and is thrown aside. The officers of an association could decide as to the merits of new inventions after thorough trial, the expense to be paid by the different companies belonging to the association; when if, in their opinion, it is advisable, the patent may be purchased at a reasonable price for the benefit of the association. By this means all railroad companies could secure the right to use all meritorious inventions at a nominal price, and at the same time be assured that they were not buying worthless trash.

It requires considerable capital to introduce a new improvement so as to bring it into general use, however valuable it may be; and as inventors seldom have the amount required they are at the mercy of a set of unprincipled rascals who have abundant means at their disposal and manage to secure the patent for a trifling sum, and then sell it to such managers as consider it valuable at an extraordinary price. If those whose business it is to purchase patents on railroad improvements would deal with none but inventors or their legally authorized agents, the objects for which the patent law was framed would be secured: namely, that those who labor successfully for the good of mankind should receive their reward. And even those patentees who have abundant means would be willing to dispose of their entire right to an association at a reasonable price. For instance, if the association had tried the merits of an improvement in car brakes, and found it to be superior to any other in use and decided to purchase it, they could agree on a certain sum per mile of road, say \$5 per mile. If every railroad company in the country was a member of the association (and all should be) we may put it at 50,000 miles, which would give the inventor the comfortable sum of \$250,000 and no further trouble or expense.

In early days of railroading even the most fortunate inventors were poorly paid, but at present, and for the future, those who produce really good improvements should experience no difficulty in securing pay for them at any price within reason. There are many inventors who are extravagant in the estimation of the value of their improvements, and their expectations are seldom realized, but the railroad system has now attained such gigantic proportions that a trifling amount from each company will, in the aggregate, amount to enough to satisfy any reasonable inventor, however important his discovery may be. As soon as it is known that the railroad management have taken measures to protect honest inventors, thousands of models will be taken out of their dusty hiding places and brushed up, and if not already completed will receive the finishing touches preparatory to a journey to Washington.

Let us have the association at once; locate its headquarters at some central point; put its management in the hands of competent and honest men, if they can be found. There are enough of the former, but it may be a difficult matter to find men that cannot be "managed" by rings of experts, but it is possible to so arrange the disbursing of the funds of the Association that the members may be tolerably sure of honest dealing.

It should be a part of the business of the association to collect statistics of railroad accidents, and get all the information that is possible in regard to their causes, and go back several years and gather all the information that may be had bearing on the subject.

When an accident occurs, the officers of the association should be informed at once, together with all particulars relating to it, and if the breaking of a wheel or an axle is the cause of the trouble, the broken part or



the whole should be sent to headquarters for examination. It is also important that the time and place of manufacture be known, the length of time it had been in use, etc., etc.

In case of a boiler explosion, specimens of plates showing the fracture should be sent, as well as plates from other portions of the boiler; the length of time the boiler had been in use; the treatment it had received; a specimen of the water used; and, if possible the pressure at the time of the explosion. In short, those reporting an accident to the association should be particular to mention all the circumstances connected therewith, in order to aid as far as possible in ascertaining the true cause of the trouble and to suggest remedies or means of prevention. Experiments should be conducted under the supervision of practical railroad men assisted by such men of science as may be necessary to arrive at facts in all matters tending to promote safety in every possible manner. These officers should publish from time to time the results of all their experiments together with all valuable information they may have collected that may be beneficial to the railroad community, such as a list of all railroad accidents and the causes thereof, as far as can be ascertained, their receipts, expenditures, etc.

But it is not necessary to mention here the many ways in which such an association would be beneficial, or to go into details in regard to the duties of officers as that may be readily ascertained when needed.

An association of this kind has been in existence in England for many years, with satisfactory management, and the safety of railroad travel in that country is said to be much greater than here and to be due in a great measure, to the efforts of the association for the prevention of accident.

English roads are built in a more substantial manner than our own, and for this reason we should not look for accidents there as frequently as on our own shambly built roads; but aside from their superior construction and maintenance of permanent way, when we consider the immense traffic and rates of speed on English roads, the degree of safety seems truly remarkable. Let us profit by the experience of our English neighbors in this matter, and let us not be behind any nation in the safety of our railroad traffic.

Who will be the first to move in the organization of the "American Railroad Association for the Prevention of Accident?"

#### Railroad Consolidation.

It is well known by the general public that an immense revolution in the direct management of railroad property has occurred during the past two years, and that, by the process of consolidation and absorption, the various trunk lines have abrogated entirely the sporadic administration of short connecting lines, and introduced harmonious action between lines forming links in the grand highways and arteries of traffic. The public have been directly benefited by this revolution in management, and the conveniences furnished both for travelers and shippers have been much greater than if several small railroads had, as formerly, been operated by different boards of direction (each, to a greater or less extent, jealous of its neighboring connections). The value of railroad property has also been considerably enhanced by the perfection of schemes which necessitated a large reduction in general expenses, and enabled the managers of the consolidated interest to dispense, at the outset, with the numerous agencies and independent organizations incident to a succession of short lines, and to control, with one staff of general officers, assisted by competent subordinates, in some instances, upwards of one thousand miles of road. The fact cannot be ignored, that the general tendency of this radical and reforming age is towards consolidation; it may be seen on the continent of Europe, where the small independent Germanic States are absorbed, and their identity merged in one grand and powerful confederation, or empire, of which Prussia is the head; it may be noticed in England, where the various telegraph lines have been successfully consolidated under governmental control; or in Ireland, where it is proposed to purchase all the railways at a fixed price, and manage them by one government bureau; and it may be distinctly traced here in the United States, where all the movements of the dominant political party tend to a *federalisation*, not a distribution, of power. In view of this prevailing tendency and progressive change of sentiment, it is not surprising that it has been determined by railroad potentates to adopt here the same course of action which has been successful in the old world; and in their arrangements for increasing the commercial importance of this vast continent, to virtually ignore State lines and conventional territorial divisions, so as to secure through and independent highways for transporting the rapidly-increasing produce of the West and Northwest to the Atlantic sea-board. There is no reason why consolidation should not answer as well here as in England, where nearly all the principal railroad lines are owned by twelve companies, whose aggregate capital is equal to nine hundred millions; and although some argue that such consolidations, and the vast power contained therein, are at variance with the theories of republican equality, by adherence to which this country has gained its present political and commercial status, still the same rule of Providence which dictates that there should be no dead level in the world of nature, religion or society, pro-

nounces strongly in favor of railroad consolidation and an exclusive concentration of power. It is true that these colossal mountains, which now loom up conspicuously in the hitherto level plain of railroading, have been created suddenly, and that, like some volcanic islands in the southern seas, their origin has been sudden and unexpected; but the eye will soon become accustomed to their appearance, and will eventually recognize the harmony and beauty of their general outline; and, as in some of nature's greatest handiworks, it is impossible, without careful study, to comprehend the various aspects of scenery which tend to make a grand picture, so it is impracticable, by a cursory view of railroad consolidation, to obtain even an approximate idea of its general harmony and compli to symmetry. These general remarks prefatory to a few comments which we desire to make in relation to certain strictures of prominent periodicals, relative to an agreement supposed to be entered into by the leading trunk lines and their connections, about uniformity of rates, and a discontinuance of that absurd competition which is injurious alike to themselves and the public. During the past four months a bitter contest has been waged between the trunk lines competing for business to and from New York and New England; and compacts, supposed to be in force, have been scrupulously ignored. It is irrelevant to our present subject to state by whom this aggressive policy of cutting rates was first inaugurated, or to enter at length into the varied tactics by which each rival line, in turn, attempted to outflank its competitors; suffice it to say that results amply demonstrated the ability of each opposing force to hold its own position, and to battle, on equal terms, for public patronage; consequently no intelligent observer of railroad matters was unprepared for an announcement that an armistice had been concluded, and that negotiations had been entered into for re-establishing rates, both for freight and passengers, on a paying basis; but a telegraphic dispatch from Mr. Jay Gould to Colonel Thomas A. Scott, Vice President of the Pennsylvania Central Railroad, appears to have excited the ire of certain self-constituted guardians of public interests; and leading periodicals, both of New York and Philadelphia, inveigh in unmeasured terms against a supposed monopoly, drawing graphic pictures of the accumulated wrongs about to be inflicted upon an unoffending and unwary public. The New York *Herald*—especially after inviting its numerous readers to look at the thousands of miles the two great trunk lines of Erie and the New York Central embrace and control, and to look at the area of country they stretch over, the many millions of people, with all their vast agricultural, manufacturing and other material interests dependent upon them, and their connections for transportation—argues that "ten per cent., more or less, in charges makes a vast difference to the public; ten per cent. addition would be an oppressive tax upon the whole community; there is danger to the pockets of the people, to the progress and material interests of the country, and, in the end, possibly to the institutions of the Republic. The dangerous power of the old National Bank, in President Jackson's time, and of the present national banking system, is nothing compared with that which must necessarily follow in the wake of the stupendous railway consolidations with which we are threatened. Something must be done to check the growing power of railway monopolies and regulate their charges. The State of Illinois has in her new constitution taken a step in the right direction; but, as most State governments are controlled by the railroads in their respective States, Congress must take the matter vigorously in hand, and make laws to regulate railroad management and railroad tariffs. The National Government must protect the people in their intercourse and trade against monopoly." The New York *Times*, treating on the same subject in a less sensational article, says:—"How to deal with this threatened evil, is a subject for grave discussion." Articles of this character are to be deprecated, as fostering an idea too prevalent in this country, that the interest of railroads and those of the public are not identical; and that in every instance, railroad managers wish to oppress, instead of benefit, the public. Journals of such well-established reputation as the New York *Herald* and *Times* should abstain from pandering to public prejudices, and, before inflaming the minds of their readers against so-called railroad monopolies, should consider the important influence which railroad enterprise has exercised upon developing the resources of this continent, by creating an unlimited demand for its agricultural and commercial productions, and giving to such staple articles as form the principal basis of our large export trade something like a permanent value. At the same time, the position must be firmly denied, that railroads are public property, and that either State or General Government can interfere with vested rights and charter privileges, except in such cases where the companies act in contravention of the franchises originally ceded to them. When railroads were first projected in this country, the experiments were new and untried; and it would be manifestly unjust, at the present day, when experience has amply demonstrated the earning abilities of these commercial highways, to curtail in any manner the privileges of those who risked their money and their time in furthering enterprises which were deemed at one time almost chimerical. No capitalists could be found willing to invest in railroad construction if there was merely a contingent, and not a fixed, value to their charter privileges; and it is to be hoped that railroad progress will not now be checked by any unreasonable limitations or repudiation of existing contracts. Besides, in most instances railroad corporations have the privilege granted them of regulating their own tariffs within a certain prescribed limit; and if they have complied with the conditions on which their charters were based, we fail to see any principle of equity under which they can be called upon to surrender into other hands the actual management of their own property. Ownership and control should go together; and if State Legislatures have conceded to railroad corporations rights which have exceeded their original an-

ticipations, they must rely upon the instinct of self-preservation, common alike to corporations and individuals, to prevent them from abusing, inordinately, such valuable franchises.

It is evident, however, that the journals which are so virulent against a consolidation of interest between the trunk lines, as alluded to in Mr. Jay Gould's dispatch, do not appreciate the real point at issue. The telegram, according to our interpretation, merely means that agreements are entered into, with some prospect of permanence, for re-establishing uniform and equitable rates of fare, both for freight and passengers, between certain common points. Whether, in addition to this, there are certain conditions about a division of business according to territorial limits, we cannot say; but it is certain that the mercantile community will support any movement which gives to rates of transportation a fixed and permanent basis. It is better for the Chicago merchants to have a uniform rate of \$1.10 per hundred pounds for his freight, than to have such rate varying, in ten days, from 25 cents to \$1.30. The traveler from St. Louis will be satisfied to pay an established rate of \$30 between that city and New York, and will deem the charge a fair equivalent for the services performed; but he is continually unsettled if the rate is, one month, \$25, and another, \$35. All intelligent people must admit that the interest of railroads and the public are identical. The latter are accommodated by the former; but these accommodations cannot be furnished unless the former receive adequate compensation for services performed, and are thereby enabled to keep their track and equipment in first-class condition. Railroads, to speak figuratively, have been missionaries of good through the length and breadth of this country: they have been the pioneers of civilization and improvement. Wealth and national prosperity have followed closely in their wake; and it is not to be believed that the persons now controlling these large corporations will ever forget the distinctive character of liberal advancement which has been a special attribute of railroads: they will not allow the consciousness of inherent power to divert them from their mission of exalted usefulness; and the public, by constant experience of the benefits conferred upon them by railroad facilities, will be induced to discard all ideas of monopoly and oppression, which are studiously instilled into their minds by unprincipled demagogues and sensational periodicals.—*Official Railway Guide.*

#### The New Passenger Station in New York.

New York has not hitherto been remarkable for its railway stations, except as their insufficiency in almost every instance might give rise to remark. There are but two lines of railway which actually enter the limits of the town, that is to say, the Harlem and the Hudson River, which by ownership and control are now practically one. The New York & New Haven road comes no nearer than the Woodlawn station, where it joins with the Harlem, over the rails of which its trains are taken into the city.

The other railways approach us by New Jersey, with a river between. Their passenger stations are on the other side of the Hudson.

For the two roads which come into the limits of the city a spacious passenger station is building on 4th avenue, from 42d to 45th streets. The north wall and front are now mainly up and the granite base course of the south wall is laid. The rear wall will be simply a succession of arches through which the trains will pass. This will be one of the largest buildings for like purposes in the world. It will be 720 feet long and of width sufficient to hold 13 trains side by side. The offices of the companies (Harlem, Hudson River, and, we suppose, New Haven also) will be in this building, and it will be the general passenger station of these three roads. Their stations, severally at 26th and 27th streets, 4th avenue, and at 30th street, 9th avenue, will be practically discontinued, though local passenger-trains will run below Spuyten Duyvel, on the track now used, to accommodate the travel from Inwood and other way-stations.

The road to connect the Hudson River line with that of the Harlem, so that its passenger trains may arrive and depart from the new station, is rapidly building, branching off at Spuyten Duyvel and following the north bank of the Harlem river and uniting with the Harlem road just above the bridge. The contracts require the completion of this connecting road by January 1, 1871. The passenger station will be finished by that time.

On this connecting road, between Spuyten Duyvel and the Harlem junction, there will be passenger stations at every mile, a great advantage to residents, and adding much to the value of property (already very valuable) in that part of Westchester county which is contiguous to New York city.

This great building at Forty-second street is admirably planned and arranged to accommodate the railway service. Its erection is a credit and honor to Mr. Vanderbilt. To this gentleman is now due the praise of having provided the two best railway depots in America, if not in the world, that is to say, the passenger station just spoken of and the freight railway station in what was Hudson square, which comprised over four acres of substantial, even massive, and lofty building, surrounded by four streets and having a frontage of 1,600 feet. If Mr. Vanderbilt's fame rested on no other basis than giving these two buildings to New York, it would make for him a respectable and enviable memory.—*The Stockholder.*

—The directors of the Southeastern Railway of England are paid salaries amounting altogether to £5,000, half of which is the salary of the chairman, Sir Edward Watkin.

—The will of the late T. W. Wason, the car builder, of Springfield, was presented to the Probate Court on Tuesday last. The property amounted to about \$500,000.



## ON LINK MOTION.

The following discussion of link motion is by a correspondent of the *English Mechanic and Mirror of Science*:

"I will now proceed to place before 'our readers' the link motion as it really is in practice, and I will explain and illustrate the principles of that very simple and beautiful contrivance in the plainest language I can command, so that even gentlemen who have yet to learn the very A B C of the business may be enabled to understand it."

"Figure 1 is intended to show the mechanical impossibility of constructing the ordinary link motion so that the centre of the link shall have no vibration. The centres of the eccentrics are set in diametrical opposition or without lineal advance—that being the position in which they impart the least motion possible to the centre of the link; and whatever the amount of centre motion in this case may be, it is caused entirely by the crossing of the eccentric rods, which crossing is an unavoidable necessity of the case, therefore, motion—more or less—at the centre of the link is unavoidable; but we always want a great deal more motion at the centre than is imposed upon it by the crossing of the rods, and this additional motion is got by placing the eccentrics so that a line connecting their centres shall be at the required distance from the centre of the shaft—and this is the lineal advance. In all these figures the eccentrics themselves are omitted, the centres only being retained as all that it is necessary to the explanation."

In figure 1 there are eight different positions of the gearing shown for one revolution. This figure is drawn from an actual half-size model which I have had constructed especially for the purpose, and the amount of vibration at the ends and centre of the link is faithfully shown; the eccentric rods are 3 feet long, the link is six inches from centre to centre of eccentric rod ends, and the circle described by the centres of the eccentrics is 8 inches in diameter, consequently the ends of the link have 8 inches of vibration in all positions of the motion; the link is suspended by the centre, and the length of the suspending bar is 21 inches. The amount of motion at the centre of the link is  $1\frac{1}{2}$  inches. *CV* is the main centre line of the crank shaft and valve spindle. The link is shown in "middle-gear" as it is called—with its centre opposite the valve-spindle. The motion of the link is derived from the eccentrics through the rods, and from them alone; and no matter what part of the link, be it the end or be it the middle, is in gear with the valve-spindle, the nature and amount of its vibration is ever the same."

Figure 2 shows the forward gear end of the link in gear with the valve-spindle, and the reversing lever (not shown) in the end notch of the rack. In this position all the movements, and attitudes, and angles made by the link during a revolution are of course identical with the middle gear position; it is impossible they could differ in the slightest degree."

In figures 1 and 2 the centres of the eccentrics are placed diametrically opposite each other, and without lineal advance; but eccentrics set in this way are not suitable for working a slide-valve, because all slide-valves have more or less of lap and lead, and, therefore, require the eccentrics to be set with more or less of lineal advance. I have also to remark that the eccentric rods shown in figures 1 and 2 are unusually short as compared with the length of the link and the throw of the eccentrics; and I have purposely made them so in order to exhibit in a conspicuous manner and on a large scale the influence which the crossing of the rods has upon the movements of the link, for short rods are more influential in that way than long ones, other dimensions remaining unaltered."

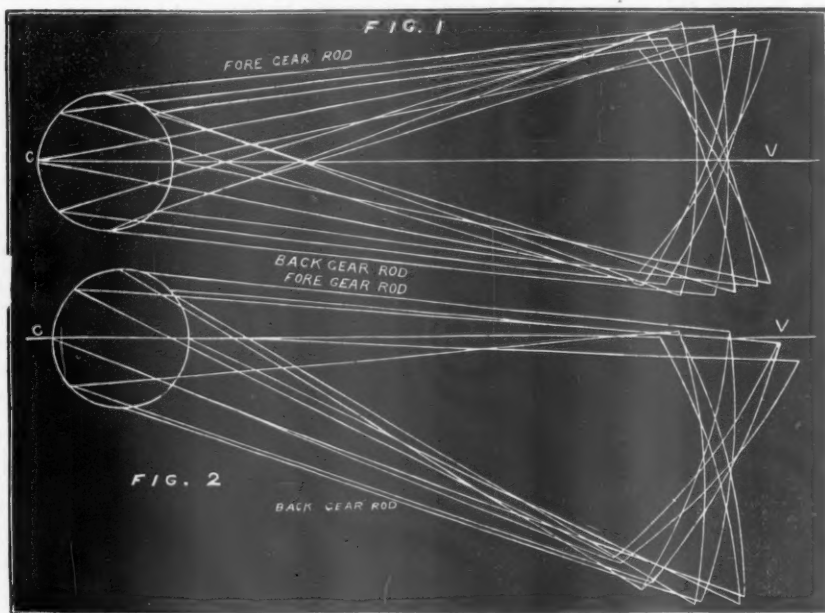
Engineers generally try to get in long eccentric rods, and in ordinary locomotive practice the length of the rod is often as much as twelve times the throw of the eccentric, and seldom, I believe, less than ten times; but in marine screw engines and in some paddle-wheel engines they are compelled through want of room to use very short rods, and lengths of five or six times the throw are common."

## Great Western Railway and the Canada Southern.

A Toronto correspondent of an English journal writes as follows about the projected Canadian lines: A railroad war is now waging in Canada, which gives promise of being an exceedingly bitter one. A battle was fought by the principals in the local Legislature, but the scene has now been changed to a wider field, and it is evident that the fight will be kept up until both roads are built, as built they certainly must be. In the meantime the battle goes bravely on, and it is hard to say which is likely to obtain the advantage. The great object in the construction of the Great Western Railway was to secure a shorter route between the Eastern and Western States than was provided by the South Shore or Erie line; and American capitalists were not slow to take advantage of the opportunity afforded them of obtaining a shorter connecting link by way of Canada. The project had been reluctantly kept in abeyance for many years, in consequence of inability to push it through; but another scheme, that of running a line between nearly the same point across the Peninsula, which had also made very slow progress, was revived and,

the old charter having expired, application was made to Parliament for its renewal. So favorably was it received that the promoters of the Great Western saw the necessity of opposing the bill with all its influence, inasmuch as it was considered that the renewal of the charter of the Niagara & Detroit River Railway would prove the destruction of the other scheme. But the friends of the Southern project were not idle, and when the bill came up for a second reading it was defeated by only one of a majority. It now became imperative to the parties of the Great Western scheme to show that they were in earnest. Stock was raised in various ways; gentlemen of influence connected with railroad enterprises on the American side saw that such a line would be of the greatest benefit to them, and they accordingly invested largely in the undertaking, and in less than three years the projected link in the chain of railways connecting New York with Chicago by a shorter route was completed. Somehow or other dissatisfaction soon manifested itself, and the American stockholders withdrew from the concern. Still the necessity for the link increased, and it was more than ever needed for the speedy transit of travel and traffic. There was no ill feeling engendered by the withdrawal of American capital, for the road was in a highly prosperous condition, and gave evidence of becoming more valuable year after year. Recently a change was made, which

any doubt but both roads will be built. There was never a greater piece of folly perpetrated than will be the construction of two Southern lines. The Canada Southern is unquestionably the line most demanded by the people interested in a railway directly connecting the West with Buffalo, and is likely to confer a greater benefit on the counties along the north shore of Lake Erie. Kent and Essex, the two counties which the loop line will not touch, have voted large sums by way of gift to the enterprise, and no doubt other counties will follow. This is the greatest of the railway rivalries that has ever occurred in Canada. The fight for a charter in 1850 was fierce enough, but was not to be compared with the battle now going on. There was a sort of rivalry between the Great Western and the Grand Trunk for the construction of a branch line to Sarnia. The matter was compromised for a few years, but ultimately the Great Western built a branch line, and the Grand Trunk terminated at Sarnia. What makes the battle of the railroads interesting is the fact that some three or four American companies have been drawn into it. The Great Western Company's loop or air line has the support of the Michigan Central and New York Central, while the Canada Southern is backed by the Erie and Michigan Southern. It is thought that other companies will yet come into the dispute. Meanwhile, another war is going on between the Erie



Link Motion.

brought the American element again into the foreground and now the line is virtually controlled by American railway capitalists. This change, it appears, excited envy, and we have now an actual railway war on hand. Something over two years ago Mr. W. A. Thomson, a contractor, formerly connected with railroads in the United States, and the Erie & Niagara Railway, made application to the local Legislature for a renewal of the Great Southern Railway charter—which was in effect the old Niagara and Detroit Rivers scheme—it having expired about that time. The application was granted, but only for a short time. Mr. Thomson failed to obtain the requisite capital, because the charter was of such a character as to prevent any variation from the route laid down. He renewed his application last session for a different route, having meanwhile come to an arrangement with parties concerned in the Midland, New York, and Michigan Air Line roads. The Great Western Railway Company, through their Canada Chairman, Hon. W. McMaster, Mr. Joy, of the Michigan Central, and Mr. M'Innes, of Hamilton, likewise applied for a charter to build a line from some point on the Niagara River to Glencoe, a point on their line about twenty miles west of London. Mr. Thomson's new design was to run from a point opposite Buffalo to another opposite St. Clair City, on the St. Clair, with a branch from St. Thomas to Amherstburg or Windsor. The Great Western scheme, which is known as the loop line, will only require one hundred miles of road to be built, while at the same time it will shorten the distance across the Canadian Peninsula by fifty miles. The necessity for a line through the southern tier of counties bordering on Lake Erie is generally admitted, as it will be shortest, but instead of one there will in all probability be two southern lines. Mr. Thomson moved slowly for a time after securing his charter—both projects having been chartered at the same time. The Great Western took advantage of this, and announced that they did not for the present intend to go on with their loop line; by-and-bye, however, Mr. Thomson began to show signs of activity. He had been fortunate enough to secure the aid of a number of United States capitalists, among whom is Mr. Daniel Drew, of New York. With the assistance of these gentlemen he has been enabled to deposit the two hundred thousand dollars required by the charter to authorize the commencement of the work, and he is now busy seeking to obtain bonuses to the amount of one million dollars from the counties interested in the road. As only two counties will fail to be benefited by the loop line, it will be no easy matter for Mr. Thomson to raise the required amount, particularly as no assistance whatever is asked for the loop line. The promoters of the loop line were prompted to immediate action by the progress made in behalf of the Southern line, the surveys have been partially made, and tenders for the construction of the road have actually been asked for. As both parties are determined to go through with their schemes, there is hardly

any doubt but both roads will be built. There was never a greater piece of folly perpetrated than will be the construction of two Southern lines. The Canada Southern is unquestionably the line most demanded by the people interested in a railway directly connecting the West with Buffalo, and is likely to confer a greater benefit on the counties along the north shore of Lake Erie. Kent and Essex, the two counties which the loop line will not touch, have voted large sums by way of gift to the enterprise, and no doubt other counties will follow. This is the greatest of the railway rivalries that has ever occurred in Canada. The fight for a charter in 1850 was fierce enough, but was not to be compared with the battle now going on. There was a sort of rivalry between the Great Western and the Grand Trunk for the construction of a branch line to Sarnia. The matter was compromised for a few years, but ultimately the Great Western built a branch line, and the Grand Trunk terminated at Sarnia. What makes the battle of the railroads interesting is the fact that some three or four American companies have been drawn into it. The Great Western Company's loop or air line has the support of the Michigan Central and New York Central, while the Canada Southern is backed by the Erie and Michigan Southern. It is thought that other companies will yet come into the dispute. Meanwhile, another war is going on between the Erie and the New York Central, the latter having cut off the Erie's connection with Suspension Bridge. The consequence is that the Erie Company are now building a line between Buffalo and the Falls, so that they will have their share of the business coming over the Great Western. Had the Central people been far-sighted enough, they would have seen that it was folly to think of forcing business into the channel, for the construction of either the Canada Southern or the Canada Air-Line will give the Erie a better connection than it now has. Buffalo is certain to be the point where the through business, East or West, must touch, rather than Suspension Bridge. Of course, the building of the loop line will be the means of taking the through business to Buffalo, which now passes over the Great Western, and the latter line will be little more than a local line. The new road is to form a connection with the Grand Trunk at a place called Canfield, and run to the terminus of that road opposite Buffalo. This saves construction and reduces the projected line to one hundred miles in length. Doubts have been expressed with regard to the building of these railways, but it is now abundantly evident that they must be built. So long as the construction of the Canada

Southern was delayed, in all probability the air-line would be held in suspense; but now that the Southern is to become a *fait accompli*, there is nothing for it but to build the loop line as well, because, as the Southern would be a much shorter line than the Great Western, the advantage would be in favor of the new route. The Southern becomes indispensable to the counties bordering on Lake Erie, and there seems to be an earnest determination of building it. Much may depend on the amount of bonuses that may be voted, but even without them the road would be constructed."

—The Danville Times, of the 17th, says: "On Thursday morning, the 15th, two freight trains collided at Embarrass water tank, three miles east of Tolono, completely demolishing one engine and several cars, and slightly injuring three men. The trains were No. 5, bound west, in charge of Conductor Charles Parker, and No. 8, bound east, in charge of John Wadener, alias 'Happy Jack.' No. 5 was at the tank, receiving water, when No. 8, at fair speed, ran into her. Engine No. 8 leaped completely over No. 5, carrying with her a car or two, alighting in the ditch, where she curled up, limp and ruined. We hear the loss of property estimated at \$75,000, including merchandise smashed up in the wreck. The collision, which occurred at 5 o'clock in the morning, while the fog was so dense that the vision could not penetrate ten rods, was the result of carelessness on the part of the telegraph operator—Smith—at Tolono. He was instructed to notify No. 8, when it arrived at Tolono, to remain until No. 5 came up. After receiving the dispatch, he lay down upon a sofa and fell asleep, and awoke only in time to see No. 8 pulling out, going, as he knew, to certain destruction. Realizing the horror of the situation, he telegraphed to Springfield that the collision would occur, at the same time tendering his resignation, which was probably accepted."

—Letters from Lima describe a sort of railway mania in Peru, which some of them say is almost a second edition of the great railway mania in England. Lines are projected from both cities of the different frontiers, especially through Bolivia."

—The State of California has commenced a suit against the Pacific Mail steamships, Montana and America, for nearly half a million of dollars, for violation of the passenger act."



# THE AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.

Report of the Proceedings of the Third Annual Convention, held in Philadelphia September 14, 15, and 16.

We give below a full report of the Master Mechanics Convention held in Philadelphia last week, prepared and compiled by our reporter from his notes and the reports in the Philadelphia daily papers, and chiefly from that in the Philadelphia Record:

## WEDNESDAY'S SESSION.

The third annual Convention of the American Railway Master Mechanics' Association met in Philadelphia on Wednesday, September 14. H. M. Britton, of Cincinnati, President of the Association, called the assembly to order, and stated that a prayer would be offered by Mr. Wells, of the Jeffersonville, Madison & Indianapolis Railroad.

The following is a list of the members who attended the convention:

Isaac Drippe, of the Pennsylvania Railroad.  
M. E. Brown, of the Erie Railroad.  
H. M. Britton, of the Indianapolis, Cincinnati & Lafayette Railroad.  
C. E. Benton, of the Indianapolis & St. Louis Railroad.  
Jas. M. Boone, of the Pittsburgh, Fort Wayne & Chicago Railroad.  
C. F. Bullock, of the Old Colony & Newport Railroad.  
John Black, of the ——— Railroad.  
R. B. Baer, of the Texas & New Orleans Railroad.  
William Burke, of the Memphis & Charleston Railroad.  
J. G. Butterfield, of the St. Paul & Sioux City Railroad.  
R. W. Bushnell, of the Chicago & Northwestern Railroad.  
M. Brear, of the Flushing & North Side Railroad.  
Richard Colburn, of the Norwich & Worcester Railroad.  
W. E. Cooper, of the Erie Railroad.  
N. E. Chapman, of the Cleveland & Pittsburgh Railroad.  
S. M. Cummings, of the Pittsburgh, Fort Wayne & Chicago Railroad.  
G. A. Coolidge, of the Fitchburg Railroad.  
Thos. Connell, of the Buffalo, Corry & Pittsburgh Railroad.  
David Clarke, of the Lehigh Valley Railroad.  
H. L. Cooper, of the St. Joseph & Council Bluffs Railroad.  
Foster Church, of the Troy & Boston Railroad.  
E. Collings, of the Camden & Atlantic Railroad.  
A. H. de Clercq, of the Toledo, Peoria & Warsaw Railroad.  
T. Denmead, of the Pittsburgh, Cincinnati & St. Louis Railroad.  
S. D. Danfield, of the Philadelphia & Baltimore Central Railroad.  
John F. Divine, of the Wilmington & Weldon Railroad.  
J. A. Durgin, of the Pittsburgh Locomotive Works.  
Harry Elliott, of the Ohio & Mississippi Railroad.  
J. B. Edams, of the Illinois Central Railroad.  
Thos. Evans, of the Catsasqua & Fogelsville Railroad.  
O. Freeman, of the Toledo, Wabash & Western Railroad.  
W. G. Freeman, of the Chesapeake & Ohio Railroad.  
W. L. Foster, of the Philadelphia & Erie Railroad.  
E. B. Gibbs, of the Iron Mountain Railroad.  
Charles Graham, of the Lackawanna & Bloomsburg Railroad.  
J. B. Gayle, of the Raleigh & Gaston Railroad.  
J. W. Glass, of the Allegheny Valley Railroad.  
Edwin Garfield, of the Hartford, Providence & Fishkill Railroad.  
H. D. Garrett, of the Pennsylvania Railroad.  
James H. Gregg, of the Erie Railroad.  
T. G. Gorman, of the Toledo, Wabash & Western Railroad.  
S. J. Hayes, of the Illinois Central Railroad.  
E. O. Hill, of the Erie Railroad.  
D. W. Haines, of the Northeastern Railroad of South Carolina.  
J. W. Holloway, of the Cleveland, Mount Vernon & Delaware Railroad.  
C. T. Ham, of the New York Central Railroad.  
N. Hayes, of the Washington & Ohio Railroad.  
A. S. Hull, of the Cumberland Valley Railroad.  
P. Hofecker, of the Lehigh Valley Railroad.  
W. S. Hudson, of the Rogers Locomotive Works.  
L. C. Brawstow, of the Lehigh & Susquehanna Railroad.  
A. W. Hibbard, of the Erie Railroad.  
J. Johann, of the Pacific Railroad of Missouri.  
C. Jauriet, of the Chicago, Burlington & Quincy Railroad.  
Wm. Jackson, of the Rome, Watertown & Ogdensburg Railroad.  
J. A. Jackman, of the Chicago & St. Louis Railroad.  
John J. Kinsey, of the Lehigh Valley Railroad.  
A. J. Keenan, of the Dayton & Union Railroad.  
Thos. Kerr, of the Camden & Amboy Railroad.  
S. Keeler, of the Flint & Pere Marquette Railroad.  
T. D. Kline, of the Charlotte, Columbia & Augusta Railroad.  
O. H. P. Little, of the Cincinnati & Indianapolis Junction Railroad.  
J. Losey, of the Louisville, New Albany and Chicago Railroad.  
H. A. Little, of the Peoria, Pekin & Jacksonville Railroad.  
T. V. Losee, of the Pittsburgh, Cincinnati & St. Louis Railroad.  
C. M. Lewis, of the Northern Central Railroad.  
J. N. Lander, of the Northern Railroad of New Hampshire.  
H. D. Landis, of the Bellefont & Snow Shoe Railroad.  
H. Lincoln, ———  
G. H. Griggs, of the Worcester & Nashua Railroad.  
D. C. Wiggins, of the Boston, Hartford & Erie Railroad.  
H. L. Leach, of the Hinkley & Williams Works.  
J. S. McElroy, of the Oil Creek & Allegheny River Railroad.  
S. Moore, of the Pittsburgh, Fort Wayne & Chicago Railroad.  
E. D. Meier, of the Kansas Pacific Railway.  
C. O. Marston, ———  
J. N. Moore, of the Pennsylvania Railroad.  
W. McAllister, of the West Jersey Railroad.  
James Mullin, of the Western & Atlantic Railroad.  
James Mullin, Jr., of the Western & Atlantic Railroad.  
A. Mitchell, of the Lehigh Valley Railroad.  
James McFarland, of the Mobile & Montgomery Railroad.  
John McFarland, of the Richmond, Danville & Piedmont Railroad.  
J. W. Nesmyth, of the Kentucky Central Railroad.  
J. B. Pendleton, of the Seaboard & Roanoke Railroad.  
J. W. Philbrick, of the Maine Central Railroad.  
F. A. Perry, of the Cheshire Railroad.  
G. W. Perry, of the Philadelphia, Wilmington & Baltimore Railroad.  
E. D. Palmer, of the Pittsburgh, Cincinnati & St. Louis Railroad.  
W. M. Parks, ———  
E. F. Perkins, of the Central Pacific Railroad.

S. M. Philbrick, of the Leavenworth, Lawrence & Galveston Railroad.  
P. J. Perrin, of the Taunton Locomotive Works.  
W. F. Ray, of the Toledo, Wabash & Western Railway.  
D. P. Rennie, of the Pittsburgh & Connellsville Railroad.  
F. Roop, of the Northern Pennsylvania Railroad.  
D. O. Shaver, of the Pennsylvania Railroad.  
W. F. Smith, of the Cleveland, Columbus, Cincinnati & Indianapolis Railroad.  
Morris Sellers, of the Des Moines Valley Railroad.  
J. H. Setchell, of the Little Miami Railroad.  
W. T. Smith, of the Philadelphia & Erie.  
J. Sedgley, of the Lake Shore & Michigan Southern Railway.  
C. B. Street, of the Pennsylvania Railroad.  
Wm. Strong, of the New York & Harlem Railroad.  
C. A. Thompson, of the Long Island Railroad.  
J. Thompson, of the Pittsburgh, Fort Wayne & Chicago Railroad.  
John Thompson, of the Eastern Railroad.  
W. F. Turritt, of the Cleveland & Pittsburgh Railroad.  
H. A. Towne, of the Hannibal & St. Joseph Railroad.  
E. Thompson, of the Southern Minnesota Railroad.  
J. K. Taylor, of the Lake Shore & Michigan Southern Railway.  
J. Van Vechten, of the Atlantic & Great Western Railway.  
A. Van Tuyl, of the Cincinnati & Indianapolis Junction Railroad.  
Reuben Wells, of the Jeffersonville, Madison & Indianapolis Railroad.  
R. D. Wade, of the North Carolina Railroad.  
W. Woodcock, of the Philadelphia, Germantown & Norristown Railroad.  
F. A. Walt, ———  
J. L. White, of the Evansville & Crawfordsville Railroad.  
J. E. Waddy, of the Orange, Alexandria & Manassas Railroad.  
E. A. Walker, of the Cape Cod Railroad.  
E. H. Williams, of the Baldwin Locomotive Works.  
J. T. Robinett, of the South Side Railroad, of Virginia.  
John E. Wootten, of the Philadelphia & Reading Railroad.  
Levi S. Young, of the Cleveland, Col., Cinn. & Ind. Railroad.  
Maj. L. J. Fleming, of the Mobile & Ohio Railroad.

## PRESIDENT'S ADDRESS.

The President delivered the following address:

Gentlemen of the Convention: Again we are permitted to be gathered together in this our third anniversary, and it is with no ordinary feelings of satisfaction and pride that I greet you in open convention.

Pride, first, because you have conferred upon me the honor of presiding, and secondly, because there is before me evidence of the not only unabated, but increased interest, as manifested by the number present, and enlarged by the addition of many new faces that have not before met with us.

Satisfaction, because our organization, undertaken with many fears and misgivings in September, '68, is no longer an experiment, but a reality.

Our session of 1869, also anticipated with some doubt, was a source of encouragement; and now this gathering of eighteen hundred and seventy, as though drawn by "brotherly love," because appointed here, proves and confirms the wisdom of all our previous efforts, and establishes the Master Mechanics' Association of America upon a basis not to be disturbed, and therefore a fixed fact.

We are now an organization that cannot fail to be productive of good results, that will be enhanced in proportion to our perseverance. Known only to ourselves for a time, we are now a recognized body of men, as being anxious to serve faithfully the interests of our employers, and to cater to the comfort and safety of the traveling public. We are recognized by the superior officers of the different lines of railway with which we are connected, and thus sustained and encouraged by the countenance they have given our undertaking.

The press has recognized us by favorable notice of our proceedings, and we have many indications that we are recognized by the traveling public, who appreciate all efforts made in their behalf tending to their comfort, speed and safety in traveling.

Favorably the owners of railroads have watched our progress and intentions, because they observe a determination on our part to promote their interests by a faithful desire to improve upon and care for their property confided to us in trust.

With all these surrounding encouragements, gentlemen, we may well feel proud of our institution, though yet in its infancy, but already indicating such permanence and beneficial results.

The object of our Association is not of a mercenary character; we gather together that by united experience we may gain knowledge in our profession, and this knowledge thus acquired cannot be stamped as a selfish desire, for it is to be directly imparted to those in our employ, and indirectly applied to the interests of the community wherever penetrated by the iron rail and traversed by the locomotive.

Let us then feel greatly encouraged in our enterprise and enter upon the work with renewed zeal, and a permanent and gratifying success will crown our efforts.

The reports of the various committees submitted to the last Convention at Pittsburgh were very satisfactory, and abounded in useful information. These have been printed in pamphlet form, and copies may be obtained by application to the Secretary.

Every member should recognize it as his duty and esteem it a pleasure to tender all the assistance possible to the various committees, by promptly contributing any new ideas in his experience, upon any topic that may come before the Convention, thus adding to the common storehouse of mechanical knowledge. After the committees appointed last year shall make their report to this Convention, an opportunity will be given for discussion, and I would especially urge upon all to participate with a perfect freedom. A member who entertains different views from those advanced by the committee, or whose experience would suggest any modification or addition to their conclusions, will, without any hesitation, I trust, make them known for our common benefit. It is only by a free interchange of thought and views, openly expressed in a free and candid discussion, that we can arrive at the object of our Association, which is the promotion of knowledge and the nearest possible approach to a perfect system of management in the practical workings of the machinery department of railways, in detail.

We may thus arrive at important and valuable facts and conclusions that could not be reached by any other channel. I hope, therefore, that no one, through modesty or otherwise, will hesitate to give us the benefit of his experience upon any topic that may come before the convention, or that may be suggested in his own mind.

I would call the attention of members to the fact that, to a very limited extent, the leading officers of a few roads have formed a wrong conception of the objects of our undertaking. In some instances it has been coupled with "labor unions," and other offensive projects that are entirely foreign to our intention.

It is desirable that members should personally make it a

point to disabuse the minds of such officers of their erroneous impression and explain fully the object and importance of our meetings and discussions, and solicit their co-operation. When we are thus fully understood they will undoubtedly heartily second our efforts to promote the welfare of our Association, and thereby sustain us in striving to unite our common knowledge and experience in whatever tends to economy, durability and safety in the management of the property committed to our care. Those of us, who can look backward twenty-five years and see the vast strides that have been made in the quality and management of machinery, can form some idea of what may be expected for the future.

Let each one of us then endeavor to make the improvement for the next twenty-five years compare favorably with the past, so that in the future, should we be spared, we may look back with feelings of pride and pleasure upon our organization of 1868; and to accomplish this, each must be willing and anxious to contribute his mite to the general fund of knowledge.

I do not wish to be considered wearisome, but there is another feature to which I would call your attention, and that is its social element. From the Atlantic to the Pacific Ocean, and from the northern Lakes to the Gulf of Mexico, by the reaching out of the iron arm of railways our various engagements are located; and were it not for our organization, being thus widely separated, we must have continued strangers to each other.

But being brought together in a business point of view, we are made socially acquainted; and by an interchange of fraternal feelings much good may be accomplished. I am glad also to learn that so many are accompanied by their wives. It is a gratification to us, and doubtless a pleasure to them, to be here. Here, in this great and beautiful city of "brotherly love," they will see and meet with much to interest and please, and from the character of its citizens, I am confident that nothing will be left undone to make their visit pleasant, and as we with them, are enjoying ourselves in a manner that a bachelor cannot, perhaps some of our single members, seeing our felicity, may spur up the courage to go and do likewise, and thus secure their happiness and well-being.

The Association is greatly indebted to our Secretary, Mr. L. P. Dodge, for his untiring efforts in our behalf, contributing largely to our success, during his travels the past year, by encouraging the attendance and interest of those entitled to membership. His duties, too, although arduous, have been filled with signal ability, having arranged the annual report for the printer, attended to mailing the same, together with a large amount of correspondence, besides other duties, that have trespassed greatly upon his time.

Shortly after our last session one of our members, whose presence and counsel will be a great loss to us, was removed by the unrelenting hand of death. J. M. Smith, Superintendent of Machinery of the Pittsburgh, Cincinnati & St. Louis Railway, fell a victim to pneumonia while in the faithful discharge of his duties. He was widely known and respected, both in his business and social relations, and enjoyed not only the esteem and confidence of his superior officers, but the love and respect of those employed under him.

George S. Griggs, Master Machinist of the Boston & Providence Railroad, died in August of the present year.

He was one of the oldest master machinists in America. He was one of the pioneers in the invention of railway improvements and developed many theories into practical facts. I can speak of him only in terms of praise as a man, mechanic and manager. Through his death our Association has lost one of its most earnest, energetic and practical members.

I hope the convention will take some action in reference to the loss we have sustained by their death and the respect in which we hold their memory.

And now, gentlemen, in conclusion, I would recommend that we be punctual and regular in our attendance upon the sessions, and that all may take an active part in the deliberations of the various subjects that may come before us for consideration. To you, then, as a body, I now commit this Convention, with many thanks for your attention and forbearance while I have been making these crude and imperfect remarks.

The next business in order was the reading of the Treasurer's report. On motion of O. H. P. Little, it was received and adopted.

Mr. Dodge offered the following: "The question having been raised as to the propriety of allowing visitors to attend the deliberations of the Association, it is moved that the privilege be temporarily accorded each member of inviting such guests as he may elect, and that the subject be referred for final action to a committee upon revision of by-laws." Agreed to.

Mr. Sellers, of the Des Moines Valley Railroad, moved a reconsideration of the vote. He thought the room should be free to all who take an interest in our deliberations.

The vote was reconsidered, and a motion by Mr. Sellers, inviting the public to seats in the hall, was adopted.

Mr. Brown, of the Erie Railway, moved that a committee of three be appointed to revise the constitution and by-laws of the association, which was agreed to, and the President appointed on the committee Messrs. D. P. Rennie, M. E. Brown and S. J. Hayes.

## REPORT ON BOILERS AND BOILER PLATES.

The Committee on Boilers and Boiler Plates made a report, in which they argue that it would be well to still further encourage the invention of appliances to promote superior evaporation by the consumption of smoke and various valuable gases, which now escape in part or altogether from railway locomotives. Mr. Boole, an eminent engineer, recommends that in the construction of boilers as few seams as possible should be presented to the water surface, which recommendation the committee indorse. It is evident that very soon bituminous coal will be the standard fuel for railroad locomotives, and they should be generally constructed for the use of coal. It is found that the American railway locomotive has no superior in the world, and that the boasted English engine could not compete with our engine on our roads, however successful they may be in Europe. The Engineers in South America say that the English locomotive is a sturdy cumbersome machine upon four legs, while the American engine is superior and runs upon three legs, which is a great advantage.

The committee recommended that there be no increase in the length of boiler tubes. As to the area of grate surface and the area between boiler tubes no positive rules can be laid down. A great deal depends upon the character of the fuel used. A free burning coal requires a large area of grate surface, while a slow and steady burning coal should be used with a smaller surface. From eighteen to thirty-six inches of grate surface is required for close burning coal. The committee think that the subject of different depths of coal in engine furnaces



should be thoroughly investigated. The committee recommend the use of steel furnace and flue plates for coal burning locomotives. The superiority of homogeneous steel for these purposes is established. The labor on locomotives is very costly, and, therefore, metals of the best quality should be used in their construction, if only for the sake of economy. Some steel plates were examined after ten years' use, and were found to be in good condition. Copper or iron plates do not last, blistering being a fruitful source of trouble with the latter. Steel plate manufacturers are now supplying an excellent article. Formerly those made were found to be porous and subject to cracking, but now no defective plates are furnished, as all are manufactured from crucible steel, and are thoroughly tested before they are fitted.

The manufacture of steel boiler plates by the Bessemer process has commenced, but as yet there has been no satisfactory trial of them made. Those in use seem to possess toughness and hardness requisite. It is believed that in the end steel plates for boilers will be found the cheapest. The committee have received a letter from an eminent French engineer relative to the construction of locomotive boilers and their use in France, Austria, Belgium and Italy. In those countries steel boiler plates are a perfect success. English and Westphalia steel is used, 49-100 of an inch thick. The metal used must be of the kind that hardens in the plates, but does not harden in the rivets. The steel from Sheffield is the best. The locomotives on the Austrian railways weigh twenty-one tons, and have steel boiler plates less than half an inch thick, which have been used for five years, and are now in good condition. All of the continental locomotive boilers are now made thicker than they were before, with double rows of rivets placed zigzag. The distance from centre to centre of the rivets in the same line is four inches.

Mr. Sellers, referring to the report of the Committee on Boiler Plates, said he did not think boilers could be constructed perfectly safe and tight with plates half an inch thick, and rivets four inches apart.

Mr. Hayes explained that the committee gave this information as coming from an eminent French engineer, and not as their own report. It should be borne in mind that the rivets, although reported to be four inches apart, were really only two and a quarter inches from centre to centre, as they were inserted in zigzag lines.

The Committee on Steel Tires and Axles were called upon to report, but asked an extension of time, which was granted.

#### REPORT ON CYLINDER AND STUFFING-BOX PACKING.

The Committee on Cylinder and Stuffing-box Packing made a report, in which it was stated that reports had been received from twenty-four companies using spring packing and thirty companies using steam packing. With pressure enough to keep it up to the rings in the cylinder, spring packing is reported to be the most economical. It is also clear that certain kinds of steam packing wear the cylinders very unevenly. Upon the question of the superiority of the two patent steam packings no opinion could be given, as twenty-one master mechanics favored Dunbar's and twenty were in favor of Stevens'. The chairman of the committee having the casting vote, gave it in favor of the Dunbar packing; but he did so conditionally, as he merely desired to thereby bring the question forward in a more positive shape.

The report was received and the committee discharged.

The discussion of the question was then begun and Mr. Jackson said that his experience led him to recommend the Dunbar packing.

Mr. Nesmyth, of the Kentucky Central Railroad, also recommended it and said that he had never had one of his cylinders cut with it.

Mr. Gregg, of the Erie Railway, said he was in favor of using steam packing, and, while he did not desire to advertise any man's invention, he believed that Dunbar's packing was the best and, in the long run, the cheapest. He had given the Stevens patent a thorough trial, but found that it did not suit. It was too open, and permitted "blowing." The Dunbar was now generally used on the Erie Railway and gave satisfaction.

Mr. Wells, of the Indianapolis Junction Railroad, said he had used both kinds of packing for a year or more. The Dunbar was the least troublesome. The Stevens packing wears the cylinders unevenly. He used quarter inch steel wire under the "rings" to reduce the pressure, with good effect.

Mr. Britton said he had used the Dunbar patent with general satisfaction.

Mr. Towne, of the Hannibal & St. Joseph Railroad, thought that the Stevens packing was the cheapest and the easiest fitted up. He had used "double rings" with good effect.

Mr. Cummings, of the Pittsburgh, Fort Wayne & Chicago Railway, said he had used the Stevens packing, with "double rings," on 180 locomotives, and liked it. Mr. Dunbar came to him, some time ago, and affixed his packing to a locomotive. It burst the cylinder out, and Mr. Dunbar had not put in an appearance since. The Stevens packing was at first fitted up loose, but it is now fitted up close in his engines, and over-pressure is carefully avoided. Under this arrangement, he thinks, the Stevens packing is a superior article.

Mr. Butterfield, of the St. Paul & Sioux City Railroad, said he had used the Dunbar packing successfully. He had used the Stevens, but found that it "blowed." This may have resulted from the fact that it was not properly fitted up, however. Subsequently he had used the packing fitted close, and had run it for three years with satisfactory results.

Mr. Hill, of the Atlantic & Great Western Railway, said he had used the Dunbar packing on ten engines, and the Stevens packing upon ten, and he thought he had given them a very fair test. He preferred the former, because, after five years' use, it had proved the safest and most efficient.

Mr. Burke of the Memphis & Charleston Railroad, said his company had purchased the right to use the

Dunbar patent on their road in 1859. The engines passed through pretty hard work during the war. They were in bad condition when he inspected them in 1865. He had to bore the cylinders out, and was induced to try the Stevens packing. It did not suit. Spring packing was then used, and subsequently the Dunbar packing was again put in. This would not work, and he put in the spring packing, which has given satisfaction for the past eighteen months, and he had not had to remove a single cylinder head.

Mr. Sellers, of the Des Moines Valley Railroad, advocated the Dunbar packing. While this was true, it was also certain that Mr. Stevens had provided a cheaper packing, but one much more liable to need renewal. By means of a ring sawed in two he had formed a sort of spring packing of his own, or, rather, of a friend of his, which operated very satisfactorily.

Mr. Johann, of the Pacific Railroad of Missouri, said that he had tried both of the patent packings for six months, and found the Dunbar suited him the best. With the Stevens packing the "ring" had too much play and admitted too much steam. When the rings were fitted closer the packing worked better, and being the cheapest he adopted it for seventy-two of his engines.

Mr. Young, of the Cleveland, Columbus, Cincinnati & Indianapolis Railroad, remarked that he had found it necessary to fix the spring ring very close for the Stevens packing. It is cheaper than the other, but the necessity of frequent renewal makes it very nearly as dear. It wears the cylinder at the end. For passenger engines the spring packing is preferred by me.

Mr. Setchell, of the Little Miami Railroad said he had used the Stevens packing on passenger engines, and found the uneven wires were soon cut. It also cut the cylinder. He applied babbitt, but to no purpose. He finally tried spring packing, and found that he could make as good time with two additional cars on a locomotive as he did with the Stevens packing without the extra cars. He attributed this to the fact that the Stevens packing will allow "blowing." He now thinks spring packing is the best.

Mr. Gregg explained that the advantage of the Dunbar packing was that it was very close; and worked closer, thus preventing all "blow." It costs less for repair, and with less fuel will do more work. On the other hand, the Stevens packing worked open, and engines with it would "blow."

Mr. Elliott, of the Ohio & Mississippi Railroad, spoke in favor of the Dunbar packing.

Mr. Little, of the Indianapolis Junction Railroad, said he had used both packings with satisfactory results.

Mr. Gregg thought this discussion had continued for a sufficient length of time, and he moved a division of the house, in order to get a positive expression of opinion in regard to the relative value of the two patent packings.

Mr. Sellers thought it improper for the convention to commit themselves to either, and doubted the propriety of taking a vote upon the subject.

Mr. Gregg—I do not want to advertise any man's invention or business. I only desire to know the preference of a majority of the delegates to this convention.

Mr. Hayes, of the Illinois Central Railroad, opposed the taking of a vote on the two patent packings. He favored a vote to decide between the preference for steam and spring packing.

Mr. Sellers thought this was unnecessary, as the discussion showed that old, expensive spring packing was generally discarded.

On motion of Mr. Setchell, the vote was laid on the table. He said he preferred to have this discussion go to the people through the medium of the public press, and to let the people decide upon our preferences.

#### BOILER INCrustATIONS.

The chairman of the committee on Boiler Incrustation said that that committee could not make a report. He asked that a paper prepared by Mr. Towne be read in lieu of the report, which was agreed to. The writer says that the only way to prevent the incrustation of boilers is to purify the water used, by means of heat, before it is introduced into the boilers. It is certainly possible for some apparatus to be invented for this purpose. Until some appliance is discovered we must put up with incrustation, scales, blisters and explosions, with all their direful consequences. The use of anti-incrustation powders, etc., is not recommended. The paper was received and ordered to be spread upon the minutes.

#### REPORT ON SAFETY VALVES.

The Committee on Safety Valves submitted a report. They suggest no further improvement for this year, except that the bearings of the lever should be knife-edged, and that every engine should have a valve not under the control of the engine driver.

The report of the committee was received, and the committee discharged.

#### SMOKE STACKS, ASHPANS AND DRAUGHTS.

The Committee on Smoke Stacks, Ashpans and Draughts made a report, but could suggest nothing novel. They recommend the rocking grate for clinker coal, and five-eighths of an inch, instead of half an inch, for grate bar spaces.

The report was received, and the committee discharged.

The Committee on Boiler Explosions asked for and obtained further time make a report.

Further time was also granted to the committee on Dead-Weight of Railroad Rolling Stock in which to prepare their report.

#### REPORT ON UNIFORM SIZES OF TIRES.

The Committee on Uniform Sizes of Tires reported that reports had been received from sixty-one companies, using three thousand and seventy-six engines, with sixty-three different sizes of tires. The committee recommend that 38, 40, 44, 50, 56 and 62 inches be adopted as centres by locomotive manufacturers, the first three to have tires three inches thick, and the last three to have tires two and a half inches thick.

The report was received and the committee discharged.

Mr. Setchell favored a three-inch tire for any and all centres.

Mr. Gregg thought that to reduce all the tires to a uniform rate would be impracticable because too expensive.

Mr. Butterfield hoped the new system and measurement would be adopted for all engines hereafter manufactured, so that at some future day centres and tires would be uniform all over the country.

On motion of Mr. Hayes, the matter was laid over for the present.

On motion of Mr. Sellers, the convention adjourned until Thursday morning.

#### EVENING ENTERTAINMENTS.

In the evening, by invitation of the Philadelphia Reception Committee, the members of the convention visited the Walnut Street Theatre.

The reception was given under the auspices of the following named contributors:

M. Baird & Co.; Morris, Tasker & Co.; A. Whitney & Sons; Bement & Dougherty; Wm. C. Allison & Sons; William Sellers & Co.; William Butcher, steel works; Merrick & Sons; Samuel Vaughan Merrick (deceased); Phoenix Iron Works; A. P. Roberts & Co.; Cambria Iron Company; Nease & Leavy; Field & Hardie; Girard Tube Works and Iron Company; Ainsworth & Naylor; Morris Wheeler & Co.; I. P. Morris & Co.; Hoopes & Townsend; W. N. Morcus & Son; Nichols, Pickering & Co.; Philip I. Potter; N. & A. Middleton, and H. W. Hook.

At twelve o'clock at night the members of the Convention of Master Mechanics were tendered a serenade.

#### THURSDAY'S SESSION.

The convention met at nine o'clock, Mr. H. M. Britton, President, in the chair.

The Committee on Steel Tires and Axles were called on for a report in order, but the chairman reported that the committee had not yet finished their report, and further time was accorded.

#### REVISION OF BY-LAWS.

Mr. Rennie, Chairman of the Committee on Revision of By-laws, made the following resolution the body of the report:

"SECTION 1. The following persons may become members of this association by signing the constitution or by-laws, on the payment of a fee of \$1; or, in case of their absence, the President or Secretary to sign for them. Any persons having charge of the mechanical department of a railway, known as 'superintendents of motive power and machinery,' 'general master mechanics,' or 'master mechanics,' or general foremen, whose names shall be presented by their superior officers for membership; also, any person who may have the above positions, and who may not be engaged in any other business or profession; also, one mechanical engineer, or the representative of each locomotive establishment in America."

The report was received and the resolution adopted and made a part of the law of the association.

#### REPORT ON CONSTRUCTION OF FURNACES.

The Committee on the Construction of Furnaces made a report, in which they state that they have received no important suggestions as to the furnaces used in engines using anthracite coal. Many of the improvements in furnaces and fireboxes have not proved successful. Tests of the brick arches of Buchanan, Weston, Jauriet and others have been reported, and it appears that weakness is the only objection to them. Great difficulty is experienced in raising the standard of combustion. The Weston firebox is the best for the promotion of the ignition of gases. It burns the fuel very clear, and very little smoke escapes. The firebox of Buchanan is also recommended for certain special advantages. It has been used with satisfaction on the Hudson River Railroad. The firebox of Mr. Jauriet, of the Chicago, Burlington & Quincy Railroad, is perhaps the best. It effects a saving of forty per centum in fuel. The coal used is from the Illinois mines, and as these mines supply the coal for the roads in Illinois principally, this is a great desideratum, as it is absolutely necessary that economy should be practised in consequence of a somewhat inadequate supply.

Mr. Benton, of St. Louis, has invented a very economic fire-box with an admirable deflector. The report is signed by E. O. Hill and James Sedgely, and was received and filed. The committee was continued for another year. Mr. Sedgely asked and received permission to retire from the committee on account of the fact that his company uses wood-burning locomotives only. Mr. H. A. Little of the Peoria, Pekin & Jacksonville Railroad, was appointed a member of the committee in place of Mr. Sedgely, retired.

In connection with the report of the committee a paper was read by Mr. Sellers, which was an able and exhaustive scientific essay on combustion in locomotives. Also an able paper relating to the consumption of coal in connection with furnace surface, written by Mr. L. W. Towne, of the Hannibal & St. Joseph Railroad.

#### CORRESPONDENCE.

The President here announced that an immense amount of correspondence had been received, and as some of it might be objectionable he proposed that the whole of it be referred to a committee of three to sift and determine its merits or demerits.

On motion, the Chair was empowered to appoint said committee, and named Messrs. Wells, Garrett and Kinsey.

#### REPORT ON SLIDE VALVES.

Mr. Thompson presented the report of the Committee on Lap and Lead of Slide Valves. It sets forth that the investigation was a most important one, which would require more time for the consideration, especially of the branches relating to questions of grade, weight of engine, etc. The committee had considered the matter only in the light of general practice thus far. Our inquiries have been confined to the outside lap, inside lap, travel of valve, and lead in full gear. Circulars had been sent to one hundred and sixty master mechanics, and answers had been received from thirty-five.



On express passenger trains, twenty-five use  $\frac{3}{8}$  outside lap,  $\frac{1}{2}$  inside, 5 inches travel, 1-10 lead; six use  $\frac{3}{4}$  outside lap, 1-16 inside,  $4\frac{1}{2}$  inches travel,  $\frac{1}{2}$  lead; four use  $1\frac{1}{4}$  outside lap,  $\frac{1}{2}$  inside, 5 inches travel,  $\frac{1}{2}$  lead.

On passenger accommodation trains, twenty use  $\frac{3}{4}$  outside lap,  $\frac{1}{2}$  inside, 5 inches travel, 1-10 lead; ten use  $\frac{3}{8}$  outside lap, 1-16 inside,  $5\frac{1}{2}$  inches travel, 1-16 lead; five use  $\frac{3}{8}$  outside lap, 8-16 inside,  $4\frac{1}{2}$  inches travel,  $\frac{1}{2}$  lead.

On heavy freight trains, nineteen use  $\frac{3}{4}$  outside lap, 1-16 inside, 5 inches travel, 1-10 lead; eleven use  $\frac{3}{8}$  outside lap,  $\frac{1}{2}$  inside,  $4\frac{1}{2}$  inches travel, 1-16 lead; five use  $\frac{3}{8}$  outside lap, 8-16 inside,  $4\frac{1}{2}$  inches travel, 1-10 lead.

The committee asked to be continued, as the investigation into valves and valve gear was not full or perfect yet.

The committee was continued for another year, and, on motion, Mr. Nesmyth, of the Kentucky Central Railroad, was added to the committee.

#### REPORT ON STEEL TIRES, WHEELS AND AXLES.

Mr. Philbrick, Chairman, presented the report of the Committee on Steel Tires, Wheels and Axles. The reports received were upon the conditions of 1,558 wheels and 6,490 tires made by Krupp, Vickers, Firth, Butcher and others. The experiments made and deductions from actual use showed that the average number of miles run to one-sixteenth of an inch wear for all steel tires is about 10,000. The following averages have been determined: Krupp's Prussian steel tire, one-sixteenth of an inch wear to 17,000 miles; Vicker's do., 14,578 miles; Firth's do., 14,743 miles; Butcher's Philadelphia do., 12,162 miles; Lowmoor do., 10,200 miles; Washburn's do., 9,141 miles.

Highest average reported of travel for 1-16 of an inch wear, 54,188 miles.

General average reported during the past year, 16,001 miles to 1-16 of an inch wear.

Much depends upon the weight of the engine and the nature of the service. On some roads the highest average is awarded to freight engines.

The average work of a  $2\frac{1}{4}$ -inch steel tire is 100,000 miles of travel before the first turning is necessary. By proper care in construction and the use of the best materials a  $2\frac{1}{4}$ -inch tire should run about 240,000 miles before it requires turning. One of Krupp's  $2\frac{1}{4}$ -inch steel tires had been run 167,000 miles without wearing enough to require turning. Butcher's  $2\frac{1}{4}$ -inch steel tire had been run 129,709 miles.

On the Great Western Railway, in Canada, two of the Krupp, out of the sixty reported in use, were broken: forty of Vickers', and eight of Butcher's. Forty-seven were broken in cold weather—thirty-three transverse and eight longitudinal fractures. The "stretch and draw" of these tires was found to be very slight and inelastic. Mr. Kinsey reported one-tenth of an inch shrinkage to the sixty-inch wheel—one-hundredth of an inch shrinkage to the foot diameter is the allowance generally adopted. Bolts and set screws are not recommended, as it is known that they promote fracture. There are not a great many steel wheels in use, and the master mechanics now using them are two to one against them, when the additional expense is taken into consideration. Some report that the Butcher steel tire wears too much on the flanges. A few master mechanics report that their steel tires are doing well, but chilled iron tires seem to have the preference.

The reports show that steel axles are about equal to chilled iron axles, and not superior. On the Kentucky Central Railroad steel axles are reported to be more durable and safer than the others. On the Lehigh Valley Railroad forty-eight Bessemer steel axles are in use, but are pronounced no better than hammered iron axles. On the Great Western Railway steel axles are deemed superior only when made of tough material with soft centers. These are good, but not superior to scrap iron. The committee are of opinion that steel tires, wheels and axles may be so improved ultimately as to justify the extra outlay in procuring them.

The report was received, and the committee discharged.

Mr. Setchell desired to know how it was that on an average of every two thousand miles of travel one sixteenth of an inch wear was reported, when it was known that any iron tire would wear better than this?

Mr. Philbrick replied that some of the reports were not complete, and some of the tires used were, no doubt, very imperfect ones.

Mr. Burke thought this whole subject should be discussed with reference to the general average of wear only.

Mr. Philbrick explained that he did not think the data presented to the committee the best that could be obtained. He was of the opinion that nearly the true average of wear was one-sixteenth of an inch to 40,000 miles.

Mr. Hayes remarked that some tires have a soft spot in them, which, giving way, made the other three tires need turning down. Some of the low averages reported might be accounted for in this way. He was in favor of the use of steel tires, and believed that they would ultimately be adopted. He favored a three-inch tire.

Mr. Nesmyth reported some steel tires on the Kentucky Central Railroad, two and three quarter inches thick, which had run 128,000 miles before they had to be turned. On his freight engines, two and a half inch tires had been run 65,000 miles on an average without turning. We run night trains for freight and that makes the wear greater. We get the best results from the thick tire for truck wheels.

Mr. Philbrick said that he had observed that steel tires do not draw or stretch much until after they are considerably worn.

Mr. Cummings thought that the condition of the rails had a great effect upon tires. If there is slipping on the rails, it must wear the tires away rapidly, and herein a great loss may be accounted for. The matter of dead-weight has also its effect, which is known to be marked.

Mr. Jackson said that he had observed that during very severe winters, on the Rome & Watertown Rail-

road, tires are more rapidly worn than in warmer weather.

Mr. Rennie thought there should be an investigation made into the average of defective tires as well as superior ones. He was in favor of steel tires, but he thought that the average of 1-16 of an inch wear to 14,000 miles of travel, would have had effect upon the community.

Mr. Burke believed that the committee had a very delicate duty to perform in this matter, and that allowances should be made for the difference in diameters, and for other causes of wear.

Mr. Holloway said the size of the wheels had not been considered by the committee in connection with the wear of tires.

Mr. Little was of the opinion that there could be no accurate average of the life of a tire arrived at, except through classified reports based upon sizes, as well as other causes affecting the wear.

Mr. Foster said he had observed that grades made a difference in the wear of tires.

Mr. Elliott said that the weight of the engine and the service done had a great deal to do with the wear of tires. Passenger engines may be run with lighter tires than freight engines. He thought  $2\frac{1}{2}$  inches was the proper thickness for tires.

Mr. Hudson said that on some roads the flanges wore out more rapidly than the body of the tire. He would like to have this branch of the subject thoroughly investigated. In chilling, sometimes blisters appear, and these leave soft spots, which are weak and give way. Some manufacturers anneal their tires and avoid these soft blister spots, but some do not.

Mr. Meier had observed that the wind on the plains had the effect to increase the wear of the flanges.

This discussion of the subject continued at great length, but no facts were evolved.

Mr. Kinsey presented the report of the Committee on Balance and Anti-friction Slide Valves. The Bristol valve is objected to because it allows the steam to escape above the valve. Sault's valve is not as reliable as the ordinary one. The Adams valve has been generally abandoned. Richardson's valve had proved defective on most roads, but was successful on one road. The committee cannot recommend any patent valve. The report was received and the committee discharged.

Mr. Meier, Chairman of the Committee on Dead-Weight of Rolling Stock, asked and obtained further time to prepare a report.

#### REPORT ON BOILER EXPLOSIONS.

Mr. Losey presented the report of the Committee on Boiler Explosions. No positive cause or rational theory has been presented for boiler explosions. They can only be likened to an avalanche. A small handful of snow, falling upon the mountain side, rolls on and increases until it becomes of immense size, and destroys all that comes in contact with it. Experiments made after accidents show that the weakest part of the boiler always gives way first. These explosions are known to result from over pressure in many instances, but we have no way to regulate this pressure to a nicety. Low pressure boilers frequently explode with the most disastrous results. Two thousand feet per second is the rate of the velocity of steam rushing out of a rupture. The force is always sufficient to rend a boiler where a rupture exists. A majority of the boilers exploding now burst upward, the crown sheet giving way first. By promptly releasing the steam a rupture may not lead to an explosion. Boilers have been known to serve well with defective sheets, but these should always be condemned. The percussive force of steam is to-day absolutely independent of all known rules of government. Tubular boilers have been discarded on the western river steamboats, because the great heating surface rendered them more liable to disaster than others. There are good and strong causes observed for many explosions, but some of them are perfectly inexplicable.

The report was received and the committee discharged. Mr. Sellers said he desired to get an expression of opinion relative to the periodical testing of boilers by hydraulic pressure.

Mr. Hudson said that the idea that the water in the boiler is the same temperature as the steam above it was erroneous. The convective pressure in the boiler agrees with the amount of heat in the water. He thought if we could make our boilers perfectly cylindrical they would not explode. The weakness of boilers lies in the laps and longitudinal seams. When the weakness occurs, it is the impact of the water which makes the explosion so terrible. The taking up of heat from suddenly heated plates by water leads to a generation of steam of such strength, elasticity and pressure, that no safety valve can relieve it. This is frequently the true cause of explosions. No hydraulic pressure test can be relied upon. It may be a test just four pounds below the exploding point, and it is useless. There is but one way to get up a perfectly or reasonably safe steam boiler. *You must use the very best material; it must be manufactured in the most approved manner, and after the boiler is well constructed it must be handled carefully and be well taken care of. This is positively the only security that we have against steam boiler explosions.* [Loud and long continued applause.]

Mr. Philbrick was of the opinion that uneven and underheating often caused an expansion of boiler plates, which results in explosion.

Mr. Hudson said there was another good test for steam boilers. It was to fill the boiler with water, tie down the safety-valve, and then heat up to the pressure required for testing. I have frequently applied this test with excellent and reliable results.

#### CORRESPONDENCE.

The Committee on Correspondence reported that several communications had been received from railway superintendents, expressing their cordial approbation of the objects and aims of the association, but the time being limited they recommended that the reading of them be confined to those received from Messrs. W. W. Evans, T. E. Zell and A. J. Cassat.

Several other resolutions of no public importance, re-

lating to the method of doing business in the convention were adopted.

#### AN OFFICIAL "ORGAN."

Mr. Meier moved that a committee of three be appointed to confer as to the advisability of engaging a certain amount of space annually in some railway paper, to be filled with matters and subjects relating to the objects of the association. By this means the members of the convention might exchange views at other times than at the time of its meeting.

This was opposed on the ground that it would not represent the sense of the majority. Individual members might confer with each other by means of private correspondence.

It was also objected that by so doing the convention would be adopting some one paper as an organ, which it was not at all prepared to do.

On motion the subject was laid on the table.

#### LATERAL MOTION OF TRUCKS.

The Committee on Lateral Motion of Trucks made a report on the amount of play which should be allowed for locomotive and car wheels when on the track. The amount was different for cars and locomotives, because the latter ran daily on the same track, while the cars are exchanged with different roads, and run through to far points over tracks of different gauge. It was earnestly recommended that a uniform gauge of track be adopted by the different roads, as an element in furthering the utility of our great railway system.

The report was received and the committee discharged.

#### BOILER EXPLOSIONS AGAIN.

Mr. Brown, of the Erie Railway, recalling the subject of boiler explosions, said that he wished the master mechanics would ask their respective presidents to contribute a certain amount of money toward instituting a series of experiments on the subject. He wanted three or four boilers purposely blown up in a safe place, and watched from a safe distance, to find out all the particulars of the explosion. The roads now blow up many boilers and get no facts. If they would put but a small amount of the same money into a series of experiments they could get facts. New and old boilers should be blown up at high and low pressures, and the conditions of the explosions ascertained.

#### AMENITIES.

At half-past three o'clock carriages were in waiting for the members of the Railroad Master Mechanics Convention and their friends. Forty carriages were soon filled, and were driven out to the Fairmount Park, where there were evidences of a lavish expenditure of money to provide comforts and pleasures for the visitors.

Ex-Mayor McMichael presided at the banquet and made a brief speech, in which he welcomed the master mechanics to Philadelphia.

Mr. H. M. Britton, of Cincinnati, replied in behalf of the convention, of which he is President.

Appropriate addresses were also made by Mr. Sellers, Mr. William D. Kelley, M. C., Mr. Gustavus Remak, Mr. William V. McKean, General Robert Patterson and others.

#### FRIDAY'S SESSION.

The convention was called to order at half-past nine o'clock by the President, Mr. H. M. Britton.

A communication was received from Mr. Wm. S. Wilson, Superintendent of the Philadelphia, Germantown & Norristown Railroad, inviting the delegates individually, and as a body, to take a trip over the road for the purpose of visiting the celebrated steel works of Mr. Wm. Butcher. The invitation was accepted, and the thanks of the association voted to the company and to Mr. Wilson.

The President stated that the Banquet Committee desired the members of the Association to be seated at the banquet table in the Continental Hotel "at seven o'clock this evening."

Mr. Britton, the Chairman, presented the report of the Committee on Finance, which was received and filed.

Mr. Hayes moved that the annual assessment for each member be made \$10 instead of \$5. Adopted.

Mr. Setchell moved that the topics for discussion for the next session be referred to the Special Committee on Correspondence, to report a revised list at the present session. Agreed to.

At the suggestion of the President, Mr. Nesbitt moved that the next annual session of the convention be held on the second Tuesday in September, instead of the second Wednesday, as it was impossible to get through with the business of the session in three days' time without overcrowding the work or passing over the business too rapidly. Agreed to, and the constitution was changed so as to accord to this motion.

#### STANDARD NUTS.

Mr. Chapman presented the report of the Committee on Standard Nuts. About one hundred circulars were sent out, and fifty-two answers were received. There is great diversity of opinion as to the proper threads to be adopted, but nearly all master mechanics agree upon the size. The committee think that nuts should be uniform, and the United States standard size is recommended for adoption.

The report was received and the committee discharged.

There was no discussion on the subject.

#### BOILER FLUES.

Mr. Jauriet presented the report of the Committee on Material for Flues. A large number of answers to the circulars sent out had been received. The majority of master mechanics favor copper for wood burning locomotives, and iron for coal burning engines. Steel tubes appear to give general satisfaction, especially upon coal burning locomotives. Some of these have been used for seven years and do not show any wear. Iron tubes came next in order of favor when fitted with a copper thimble as a seat in the flue sheet. Brass and copper tubes are recommended for wood burning locomotives. One brass tube, which has been used for twenty years, shows no signs of wear, while another was found to be



worn out after four years' use. The different metals have the same effect in generating steam, although copper is known to be a superior conductor of heat. There should be no increase of thickness in the manufacture of tubes. The committee ask that the investigation of the subject of steel flues be continued. The amount of scale formed is the same in all metals. Steel and copper seem to accumulate the least scale, and are, therefore, preferable.

The report was received and the committee discharged.

#### DEAD WEIGHT OF ROLLING STOCK.

Mr. Meier presented the report of the Committee on the Dead Weight of Rolling Stock. This question, in the opinion of the committee, is one of great importance. There appears to be no remedy for the great evil of overweight. Answers to the circulars sent out came in sparsely, but most of those received favor a reduction of the weight of locomotives. The usual weight of a locomotive is 58,125 pounds; average weight in the truck of an engine, 16,408 pounds. The average useful weight on drivers is 41,717 pounds, or as 100 to 255, hence the average total weight of engine, with tender loaded, is 101,713 pounds; average weight on the truck, 18,499 pounds; average weight of tender, with water and fuel, 39,267 pounds; average dead-weight, 57,776 pounds; average useful weight on drivers, 43,937 pounds or as 100 to 76. Baker's cylinder is recommended by the committee as combining steamchest, cylinder, and one-half of the saddle in one casting makes a considerable reduction in the weight.

Wrought iron or steel steam pipes might recommend themselves, but as yet steel is impracticable for cylinder and saddle castings. The committee recommend an investigation of the subject of steel flues. A great many new locomotives are defective in weight, and there is too much stiffness in the springs. The weight is two thousand three hundred pounds per wheel. Better arrangements should be made for taking in fuel and water, as well as for economy in this matter of dead-weight. The improved locomotives of Mr. Hudson, of the Rogers Locomotive Works, and those of Mr. Forney and Fairlie, are recommended by the committee. The carrying of too much water is always to be avoided. The average weight in the front truck is set down at sixteen thousand three hundred and sixty-eight pounds. The best foreign engines have a higher average than this. Some means for the consumption of smoke and gases is greatly needed on our locomotives. This would enable us to carry less fuel. Steel is recommended for pistons, piston rods and rod heads, as its durability will make it unnecessary to use so much metal as at present where iron and copper are employed.

#### THE FAIRLIE ENGINE.

Fairlie's engine has less wheels and boxes to oil and carry, but the driver requires two assistants. The owner says it will draw eighty-eight cars, at good speed, with less oscillation than other engines. As to cars, there seems to be no way of lessening the dead-weight. We travel every distance here, and we arrange our passenger cars for easy, safe and comfortable traveling. Our day and sleeping cars are unequalled in the world for strength, magnificence and comfort. The dead-weight of these is very great—not less than 450 pounds per passenger, nor more than 1,000 pounds. The people seem to be opposed to reducing this weight, and like our heavy carriages best, because they run steadily, easily, and are comfortable. Iron trucks are recommended as being lighter than wooden ones, in comparison to strength and durability. These weigh 18,360 pounds per car, 37 4-5 per centum of which is dead weight. English carriages have 33 per centum dead weight.

The report was received and the committee discharged.

#### MR. EVANS ON THE "FAIRLIE."

On motion, a communication from Mr. W. W. Evans, of New York, was read in connection with the above report. It describes the Fairlie engine, with which the committee seem to have been favorably impressed, in very disparaging terms. Mr. Evans says the Fairlie engine is advertised in the builders' circular as weighing only forty tons full and thirty tons empty. In England the weight of this engine is given at fifty-four tons, and an actual measurement and weighing by a practical American Engineer shows that the Fairlie locomotive weighs sixty English tons and sixty-seven American tons. The fact is that Mr. Fairlie is not the real inventor of this locomotive. A similar engine was invented by the Cockerills, at Skrang, in Belgium, eighteen years ago. It proved a failure in the Austrian fairs. Herr Engerth described a similar engine, sixteen years since, as tried in Germany unsuccessfully. Mr. Fairlie knows that he is not the inventor. Similar engines have been used in France, and long since abandoned. The only one made in England has been exhibited to a host of lords and barons, but is now voted a failure. It would not run around corners, and finally had to be towed back to the engine house.

Mr. Fairlie has obtained an order for one of his engines, to be used on the Arequipa Railway, in Peru. Mr. Evans says that if Fairlie's "Little Wonder" locomotive can compare at all favorably with the Baldwin & Rogers' locomotives he has in use there now, he will forfeit \$5,000 in gold, and "I will give him as many orders as he can fill for five years to come." Fairlie says that if his engine is used the tracks will last three times as long as they do now. Mr. Evans says this is nonsense. Mr. Fairlie says that his locomotive needs "breathing places" on the road over which it travels. Mr. Evans rejoins that if ever Fairlie's "Little Wonder" has to go up the heavy grades of the Arequipa Railroad, on the Titicaca mountains, it will be entirely out of breath before it reaches the top. The American locomotives take one hundred-ton loads up these heavy grades. They round sharp curves easily, and are altogether superior to anything in the world. The letter was accompanied with a tabular statement of the performances of the locomotives, English and American, showing the great superiority of the latter. The communication was received and ordered to be spread upon the minutes.

The discussion of the report of the committee was then begun, and Mr. Jackman said he agreed with the committee in their statement, that we should seek, hereafter, to avoid carrying so much dead-weight. On the Chicago & Alton Railroad we use stout iron bumpers, made to join close, as though two cars were one. These cars are interlocked so that one car bears the weight of any jar or shake which may happen to the following car. All of our cars start exactly at the same moment. This arrangement adds to the safety of the train, and saves the swing around the curves, but requires more power in the locomotive. To draw these trains we have to use very powerful locomotives. If the weight of our locomotives could be reduced, say to twenty-five tons or less, it would be a great advantage. We have to use engines on our road weighing from thirty-four to thirty-eight tons.

#### COLD ROLLED SHAFTING.

Mr. Sellers presented the report of the Committee on Cold Rolled Shafting. Upon the subject of the use of cold rolled iron in guide-rods, etc., the committee have no reliable data. In shafting its use is increasing, and it is recommended for its cheapness, as it requires but little labor to work it up. Its wearing qualities are superior, and its toughness is marked. It has great strength, and is not subject to oxidation. It is admirably adapted for piston rods, and it is shown that rods made of cold rolled iron do not require turning at frequent intervals. Experiments made under the auspices of the Franklin Institute, of Philadelphia, show that it has great tension strength, but rather less than that of steel. It is superior to hammered or twisted iron. The objection to cold rolled iron for shafts is that it is liable to spring when key seated, but this, the committee think, can be avoided in future manufacture and management.

The report was received and the committee continued. Mr. Meier said he thought the communication of Mr. W. W. Evans too personal to be received and spread upon the minutes of this convention. On motion the vote was reconsidered.

Mr. Rennie moved that the tabular statement accompanying the letter be placed on the minutes.

Mr. Meier objected, because this statement, like the letter, is *ex parte* in character. He moved that the communication be laid on the table, and the thanks of the convention be tendered to Mr. Evans. Agreed to.

Mr. Mulligan presented the report of the Committee on Application of Brakes. The wedge and all other devices for brakes which places the retarding force on the rails, are objected to by the committee, as tending to reduce the safety of trains.

The report was received and the committee discharged.

#### VARIOUS REPORTS.

The Committee on Steam, Mercury and Water Gauges, asked for and obtained further time for the preparation of their report.

Mr. Shafer presented the report of the Committee on Style of Freight Engine. The committee cannot recommend any uniform style, as the grades of roads, weight of engine and character of load to be drawn have to be considered in connection with the style.

The report was received and the committee continued.

Mr. Britton presented the report of the Committee on Uniform System of Mechanical and Running Time Reports for Locomotives, etc., comprised in a general printed form, copies of which were handed to delegates for their inspection.

Mr. Hayes and Mr. Jackman thought the uniform rate of ten miles per hour for switching was too high for a locomotive in most cases. They thought six miles per hour would be an ample allowance.

Mr. Rennie moved that a committee be appointed to nominate officers for the ensuing year, which was agreed to, and Messrs. W. F. Smith, Morris Sellers and H. A. Sellers were appointed such committee.

On motion of Mr. Setchell, the communication from Mr. W. W. Evans was taken from the table and referred to the committee on Freight Engines.

A recess was here taken for the collection of the assessment of dues by the committee on assessments—Messrs. Burke, Nesbitt and Setchell.

On re-assembling, the Committee on Correspondence, Messrs. Meier, Ham and Gregg, reported the following, which were unanimously adopted:

WHEREAS it has pleased God, in His inscrutable providence, to remove from our midst two of our most valuable members, Geo. H. Griggs, of the Boston & Providence, and James M. Smith, of the Pittsburgh, Cincinnati & St. Louis railroads; therefore, be it

Resolved, That we deem the record of their work, in their own sphere of action, their most fitting and brightest epitaph.

2. That we will cherish their memories in using the knowledge and materials their talents and labor have left us heir to.

3. And that to their families we extend our fraternal sympathy in this saddest of bereavements, which the earnest hope of an eternal reunion alone enables man to bear.

#### VARIOUS COMMUNICATIONS.

A communication was received from the *Travelers' Railway Guide* Publication Company, asking for the members of the association, and accepted.

A communication from Charles Wilson, Grand Chief Engineer of the Brotherhood of Locomotive Engineers, was respectfully returned on account of the subject being one not within the province of the convention.

A letter of resignation from J. M. Young, late Master Mechanic on the Erie & Pittsburgh Railroad, was received, and the Secretary directed to correspond with him, there being some misunderstanding in the matter.

On motion of Mr. Jackman, a committee was appointed to select a place for the next meeting of the convention, consisting of Messrs. Jackman, Pendleton and Philbrick.

#### OFFICERS FOR 1870-71.

Mr. Smith presented the report of the Committee on Nominations, recommending that all of the incumbent officers be re-elected, in view of their faithful and efficient service, and suggesting that the constitution be

changed so as to create the office of second vice president.

The suggestions of the committee were adopted, and the following gentlemen were unanimously elected to serve for the ensuing year:

President, H. M. Britton; First Vice President, N. E. Chapman; Second Vice President, J. B. Pendleton; Treasurer, S. J. Hayes; Secretary, L. P. Dodge.

The committee appointed to prepare subjects for discussion reported, recommending the continuation of a majority of the old committee.

On motion of Mr. Holloway, a committee, consisting of Messrs. Little, White and Gale, was appointed to devise a suitable testimonial for the Secretary, Mr. Dodge.

#### SUBJECTS FOR DISCUSSION.

The following topics for discussion and inquiry were added to the regular list:

"On the practicability of placing indicators on engines, to ascertain the number of revolutions made by drivers."

"On ascertaining the merits of steel for links, guides and crank pins, as compared with the best quality of iron case-hardened."

"What proportion should the surface of the water in the boiler bear to that of heating surface, and what should the amount of steam space be for a given heating surface to insure the best results?"

On motion, a regular committee was appointed on the application of compression brakes to locomotives and on the use of soft steel for rivets.

The committee on the devising of a suitable testimonial for Mr. Dodge, the Secretary, reported in favor of presenting him with \$500, which was adopted.

The Committee on Assessments and Collection of dues reported that the total amount collected from members was \$1,086.

Mr. Butterfield offered a resolution, to the effect that a committee be appointed to compile the highest, lowest and average performances of locomotives, and report at the next session.

The subject was finally referred to the Finance Committee.

On motion of Mr. Meier, the President was authorized to appoint a committee to inquire into the practicability of publishing a monthly magazine, to be controlled by the association, and to inquire what amounts certain railroad companies will be willing to contribute toward its support.

The President appointed Messrs. Meier, Jackman and Sellers such committee.

The committee on selection of a place for the next meeting reported three cities—Louisville, Chicago and New York—from which the convention could choose.

A vote was taken and resulted as follows: Louisville, 41; Chicago, 20; New York 16.

Louisville was then made the unanimous choice of the convention for the next place of meeting.

#### COMMITTEES.

Messrs. Reuben Wells, Jacob Losey and John Skidmore were appointed a committee to make arrangements for holding the next session.

The following committees on topics for discussion were then appointed:

On boilers and boiler materials—Messrs. Hayes, Anderson and Jauriet.

On steel tires, wheels and axles—Messrs. Perry, Wigan and Lander.

On cylinder and stuffing-box packing—Messrs. Haynes, Robinett and McFarland.

On boiler incrustations—Messrs. Towne, Boone and Marston.

On safety valves—Messrs. Wells, Setchell and Nesbitt.

On boiler explosions—Messrs. Losey, Gale and Little.

On dead weight of rolling stock—Messrs. Meier, Benton and Gibbs.

On construction of furnaces—Messrs. Hill, Smith and Little.

On lap and lead of slide valves—Messrs. Thompson, Coolidge, Nesbitt and Garfield.

On style of engine for freight service—Messrs. Shafer, Cummings and Rennie.

On finance—Messrs. Britton, Sedgeley, Smith and Boone.

On indicators for revolutions—Messrs. Hudson, Leach and Williams.

On merits of steel for crank pins—Messrs. Ham, Gregg and Strong.

On water surface, in boilers—Messrs. Philbrick, Jackson and Hill.

On lubricating oils—Messrs. Burke, deClercq and Bushwell.

The Committee on Resolutions reported in highly complimentary terms to the Philadelphians, tendering the thanks of the Association for their generous hospitality, congratulating them for their success in the mechanic arts, and offering thanks also to the press and the railroads.

On motion, the convention adjourned to meet at Louisville on the second Tuesday in September, 1871.

—The New York Central & Hudson River Railroad Company announces a semi-annual dividend of four per cent. on the stock and interest scrip, payable on the 15th of October. The dividend is, in the aggregate, the largest in amount of any single corporation in the United States—\$3,600,000, or at the rate of \$7,200,000 per annum, on \$90,000,000. The net earnings of the year, besides yielding the above dividends on the stock, and over \$1,000,000 to the interest and sinking fund of the debt, have enabled the Vanderbilt management to pay off \$2,000,000 of the principal of the debt.

—The west end employes of the Great Western Railway of Canada, held their annual picnic at Komoka, near London, on Wednesday last.



## General Railroad News.

## OLD AND NEW ROADS.

## Portland &amp; Ogdensburg.

While the Maine section of this road is well under way and the Vermont section under contract, the line through New Hampshire is not yet begun and not entirely located. The exact route through the Notch has not yet been determined upon. Three different surveys have been made, and one which follows the side of Mount Webster is said to bring the grade down to only sixty-five feet to the mile. By going in a more direct line and by a somewhat heavier grade a mile and a half in distance may be saved. The heaviest grade proposed is about one hundred feet. There was an informal meeting of the directors and engineers of the road lately to hear a report from B. H. Latrobe of Baltimore, the distinguished engineer of the Baltimore & Ohio Railroad. Mr. Latrobe gave it as his opinion that a railroad through the Notch is entirely practicable.

## Grand Rapids &amp; Indiana.

The Grand Rapids *Eagle*, of the 14th, says:

"The laying of the last rail on the Grand Rapids & Indiana Railroad, south of the city, was accomplished on the 13th inst. The Grand Rapids & Indiana Railroad track now extends from Fort Wayne, Ind., to Paris, Me. costa county, and will be ballasted and ready for business in less than thirty days. From Fort Wayne through to Cincinnati, a distance of 170 miles, is just about in the same state of forwardness, the last rail having been laid on the 12th inst. On or before the 15th of October, cars will run through from Paris, on the Muskegon, to Cincinnati, on the Ohio River, direct, with a connection with the Bellefontaine & Indianapolis Railroad at Muncie. We are assured that the work of grading on the next twenty-mile section north of Paris, will soon be commenced, the locating engineers having completed and reported their line through to the Manistee River, fifty-five miles north of Paris. Contracts for this work will be made without unnecessary delay."

## Des Moines Valley.

Work is progressing on the bridge over the Des Moines in Fort Dodge.

## Burlington, Cedar Rapids &amp; Minnesota.

Arrangements have been made by which passengers are now taken from Cedar Rapids and all intervening points to Waterloo on railroad tickets. The cars run to the end of the track, and then passengers are taken in carriages to Waterloo. The carriage distance was about six miles last week, but will soon be annihilated. The Burlington *Hawk* says:

"With reasonably good weather, the company expect to have their line completed from Burlington to Cedar Falls this season, there connecting with roads already in successful operation, so as to open up the great air line route from St. Louis to St. Paul early in November. The through route will be made up of the Rockford, Rock Island & St. Louis, from St. Louis to Monmouth; Chicago, Burlington & Quincy, from Monmouth to Burlington; Cedar Rapids & Minnesota, from Burlington to Cedar Falls; Cedar Falls & Minnesota, from Cedar Falls to the State line of Minnesota, and Minnesota Central from the State line to St. Paul."

This route is so made up that it will hardly be operated as one line. At least it has been found impossible heretofore to work the two northern sections harmoniously.

## Toronto &amp; Nipissing.

The directors expect to open for business 41 miles of this railroad, from Toronto to Uxbridge, during the present season and have the line completed from its junction with the Grand Trunk at Scarboro northeast to the waters of Gull River at Cobocok within a year. A grant will be asked to enable them to extend it 40 miles beyond Cobocok through Minden to Trading Lake. This is a narrow (3 ft. we believe) road, with iron weighing 40 pounds to the yard.

## Burlington &amp; Southwestern.

Davies & Atlee have the contract for grading and bridging eighteen miles of this road, from Junction (near Fort Madison, Iowa,) to Farmington. The work is progressing rapidly and they are now securing the ties and putting in the bridges. The road will probably be completed to Farmington this fall and to Bloomfield early next spring.

## St. Joseph &amp; Denver.

We gave in these columns some two weeks since the terms of the contract by which this road virtually passed under the control of the contractors, Messrs. Nave, Steel and others. The *Hiawatha Dispatch* gives the following statements with reference to the company:

"The eastern division extends from Elwood to Maryville, and upon this mortgage bonds to the amount of

\$1,500,000 were issued, the principal part of which have been sold, furnishing the money which has been expended this season in pushing the road forward so rapidly. The western division of the road extends from Maryville to Fort Kearny, and upon this mortgage bonds have been issued to the amount of \$5,500,000, all of which Messrs. Nave, Steel & Co. are to receive for the construction of the road. The road will probably be completed to Maryville by the 1st of December, 1870, and in eighteen months from that time these contractors agree to run the cars to the junction with the Union Pacific. The all important question which the people of our country ask, is how is this to affect our country stock in the road? If this contract had not been made we would probably have had on the first of next January 110 miles of completed road, with a debt of \$1,500,000 of stock. All will agree that the road can pay nothing until it is completed through to the Union Pacific. The interest on the debt would have to be promptly met, and until the road could earn enough to meet it, the stock would have no value. With this contract consummated, we shall have on the first day of June, 1872, a complete line of 260 miles of road, on which there will be a mortgage of \$7,000,000 and an issue of \$3,595,000 of paid up stock. To meet this debt the company will have 1,000,000 acres of choice lands, which at a low estimate will pay one-half of the debt. There can be no doubt that with careful management the stock of the road can be made to be worth its par value. That it will be well managed by the men who will soon assume control of it, cannot be well questioned. They are among the leading business men of St. Joseph, men of large wealth, and of unquestionable integrity, with every interest in the speedy and successful completion of the road; who can for a moment doubt that they will promptly carry out their part of the contract?"

## Great Western of Canada.

The tender for the construction of the first section (38 miles) of the Glencoe & Buffalo branch has been let to Henry Yates.

## Peninsular of Michigan.

This railroad was finished to Climax, 8 miles southwest of Battle Creek, on the 13th inst. The entry of the first passenger train into Climax was celebrated by a grand picnic and speeches by President L. D. Dibble, Contractor Henry and others.

## Goshen &amp; Warsaw.

That part of a line from White Pigeon southward between Goshen and Warsaw has been completed for some time, but for the present the prosecution of the work is suspended, awaiting a decision of the constitutionality of the Indiana aid law, by the Supreme Court. This decision is to be made this fall.

## Lafayette, Bloomington &amp; Muncie.

The Illinois section of this road from Bloomington eastward, 81 miles, has been made ready for the rails within the four months past under the charge of R. P. Morgan, Jr., the Chief Engineer, by Snell & Taylor, contractors. Mr. Morgan is the inventor of the patent Gothic arch elevated railroad for Broadway which has attracted much attention of late.

## Oshkosh &amp; Mississippi.

Oshkosh voted almost unanimously on the 16th inst. to appropriate \$75,000 of its bonds toward the construction of this road. This, it is thought, secures the construction of the road as far as Ripon, about 18 miles southwest.

## Maple Valley Railroad.

This is the name of a company recently organized to build a railroad from Storm Lake, a station on the Dubuque & Sioux City Railroad, 85 miles west of Sioux City, in a southwesterly direction down the valley of the Maple River through the counties of Buena Vista, Lee, Ida and Monroe to Onawa, a station on the Sioux City & Pacific Railroad 37 miles from Sioux City and four miles from the Missouri River. It would make nearly a right-angle with both of these roads, would have for most of the way a territory from thirty to forty miles wide between it and another railroad, would afford a direct outlet by a very practicable route for this large and extremely fertile country, and could hardly fail of an enormous local traffic. It is intended to extend the road eventually in both directions to make connections with the Union Pacific to the southwest and some Minnesota road to the north.

The first Board of directors are Chas. Hathaway, Dubuque, President; S. W. Hobbs, Storm Lake, Secretary; J. F. Duncombe, Fort Dodge, Attorney and Treasurer; and Platt Smith Dubuque; J. H. Moorehead, Ida Grove; and B. D. Holbrook, Monona.

## Intercolonial Railway.

Substantial progress is being made in the work. The contracts are now let, and the work is being actively prosecuted on the entire length from Riviere du Loup to Miramichi, and from Sackville to Truro in Nova

Scotia. The contracts between Miramichi and Moncton, all that remains to complete the entire line, will be let on the 6th of October next. The estimates for July and August reached the large sum of \$200,000 per month, and all the labor that is available is being employed upon the works.

## Lewiston &amp; Mechanics' Falls.

A railroad eight or ten miles long is to be built from Lewiston on the Androscoggin Railroad west to Mechanics' Falls on the Grand Trunk. It is to be completed next summer.

## New Haven, Middletown &amp; Willimantic.

The chief engineer is Gen. Edward W. Serrell. C. D. Ward, of New Jersey, is resident engineer of the Eastern Division; C. E. Botsford has charge of the Portland Division; G. T. Hall, of the Middle Division, and R. M. Graham, of the Willimantic Division. Atchinson & Co., of New York; John O'Connor & Co., of New Jersey; Cook & Stevens, of New Jersey; Edwards Brothers, of New Hampshire, and the heirs of M. H. Griffin, of Middletown, have sections of the work, some of which are completed, while others are in an excellent state of forwardness.

## Paterson &amp; Newark.

This road, which had been closed for some time, was reopened for business last Monday, having passed under the control of the Erie.

## Dubuque &amp; St. Paul.

Minneapolis and Zumbrota, in Goodhue county, Minn., have each voted \$20,000 to the proposed line from St. Paul by way of Cannon Falls and Mantorville to Austin.

## St. Paul &amp; Sioux City.

This company owns \$4,000,000 worth of road and running stock, and has not a single bond out, all its property being owned in stock, not a dollar of which has ever sold below par; the majority of stock is owned by the Board of Directors.

## Atchison, Topeka &amp; Santa Fe.

The directors have effected an arrangement by which Messrs. Peabody & Co. become the bankers of the corporation. Mr. F. H. Peabody has become one of the directors, and Mr. Oliver W. Peabody one of the trustees. The completion of this road to Emporia was celebrated on the 16th.

## Western &amp; Atlantic.

This railroad (Atlanta to Chattanooga) is making special efforts to promote and accommodate travel to the Georgia State Fair, which is to be held on its line at Oglethorpe Park, two miles from Atlanta, on the 19th of October. It is expected that this fair will be national in its character, and exhibitors and spectators are invited and expected from the North and West as well as from Georgia and the South. The Western & Atlantic is advertising the fair largely as well as offering reduced rates of passage.

## Mobile &amp; Northwestern.

A company with this name has been chartered to build a railroad from Mobile northwestward to a point on the Mississippi opposite Helena. It would be about 300 miles long, nearly one half through pine woods and the rest through a fine cotton country.

## Sonoma (California) Railroad.

One mile of track was laid in the first week of September extending from Petaluma toward Santa Rosa. It is now believed the rails will all be laid between Petaluma and Santa Rosa before the rains set in. Early next spring the road will be completed to Healdsburg. After this, it is said, rails will be laid from Petaluma to Lakeville, making a complete road from Lakeville to Santa Rosa, which will probably be extended, in proper time, further north.

## Valley, of Virginia.

The city of Staunton has voted an additional \$50,000, making the total subscription of \$300,000, which insures the construction of the Valley Railroad from Harrisonburg to Salem, via Staunton and Lexington. The remaining \$250,000 are subscribed by private individuals.

## Kentucky Central.

In the suit of the old stockholders of the Covington & Lexington Railroad Company against the heirs of R. B. Bowler, and others, involving the title to what is now known as the Kentucky Central Railroad, and which has been pending several years in the Kenton Circuit Court, was decided on the 20th instant, by Judge Menzies, in favor of the defendants. The case was one of great magnitude. Plaintiffs prayed an appeal, and will, it is thought, take the case to the Court of Appeals.

## San Joaquin Valley.

This new California railroad is progressing rapidly. A massive bridge over the Stanislaus, about 20 miles above Stockton, is nearly completed.

## St. Louis &amp; Southeastern.

The contractors on this road have finished their work between Belleville and French Village, so that, with the



exception of a few miles east of the Mississippi River, the road-bed west of Belleville is ready for the ties and rails.

Rockford, Rock Island & St. Louis.

Monmouth offers \$75,000 to secure the location of the company's shops in that place. Beardstown offers 60 acres of land for the same purpose.

New Line from St. Paul to Sioux City.

The St. Paul Press says: "A large force of engineers under the charge of Mr. Shields, one of the engineers on the Lake Superior & Mississippi Road, has been set at work to survey a line from this city to Sioux City, Iowa, which will be virtually a continuation of the Superior Road to Sioux City.

"This new railroad will start on the low ground somewhere below the St. Paul Bridge, in West St. Paul, run back up through the ravine, and by the most direct route to Sioux City. At different points along the road it will diverge from eight to forty miles from the present St. Paul & Sioux City Railroad, and shorten the distance some thirty or thirty-five miles.

"The railroad will run through the following counties in this State: Dakota, Scott, Le Sueur, Blue Earth, Watonwan, Martin and Jackson counties.

"In Iowa it will run through Dickinson, Clay, O'Brien, Cherokee, Plymouth and Woodbury counties."

Maine Central.

At Bangor on the 14th inst., Chief Justice Appleton denied the application for an injunction upon the Maine Central Railroad Company to restrain them from altering the gauge of the road from a broad to a narrow gauge, as asked for by John Ware, the Court holding the proposed change of gauge would not necessarily be an act of waste or injury to property such as to call for the interference of the Court by an injunction. W. C. Crosby, in behalf of Nathan Cummings and other stockholders of the Maine Central Railroad, filed a bill in equity, praying for an injunction against the Maine Central Railroad and the directors against carrying out of the contract of consolidation with the Portland & Kennebec Railroad; also against the building from Danville Junction to the line of the Portland & Kennebec Railroad in Cumberland county; also against a change of gauge and for the appointment of receivers. The second Tuesday of October was fixed upon at Portland for a hearing.

Terre Haute & Danville.

Work is progressing finely between Newport and Perryville, Ind., and the grading is to be completed this season.

New Albany to St. Louis.

Five miles of the grade of this road between Princeton, Indiana, and Mount Carmel, Illinois, is completed. Baraboo Air Line.

The town of Baraboo, on the 10th inst., voted almost unanimously in favor of issuing \$70,000 in bonds to this company; \$50,000 to be exchanged for bonds of the company and \$20,000 for right of way. Freedom and Greenfield, towns west of Baraboo, have also voted in favor of subscription.

Northern Pacific.

It is intended to have 16,000 tons of iron for this railroad at Duluth before navigation closes. From Erie, Ward's steamers will take 5,000 tons and sailing vessels as much. Part of this has gone forward. The Winslow line is to bring 3,500 tons from Cleveland. This will be enough for about 200 miles of road.

Frederick & Pennsylvania Line.

This is an extension of a branch of the Pennsylvania Railroad through Maryland in the direction of Harper's Ferry. It will extend from Littlestown, which is the southwestern terminus of a branch of the Wrightsville, York & Gettysburg Railroad (leased by the Northern Central) southwesterly to Frederick City, about 35 miles, 2¼ of which are in Pennsylvania. Most of it is now ready for the iron. An extension of 20 or 30 miles would connect it with the Pennsylvania Company's Shenandoah Valley line, and open almost an air-line from Philadelphia to Chattanooga and New Orleans.

Quincy, Pittsfield, Carlisle, Vandalia & Mount Carmel.

This company, which can at least boast of the longest name on record, is to be organized on the 26th instant at Vandalia. It proposes to construct a line from Quincy southeast to Mount Carmel, where it is to connect with the road to be built from New Albany to St. Louis, by which it would also have connection with Evansville from Princeton, Ind.

Baltimore & Potomac.

With the exception of the wooden superstructure for the bridges over the Patuxent rivers, and two other streams, the road is ready for the track from the Patapsco River to Upper Marlboro', a distance of 29¾ miles on the main stem, and from the Junction at Huntington to the District of Columbia line, a distance of 10¾ miles, on the Washington Branch. In all 40½ miles. The

right of way has been secured, and the contracts awarded for graduation, masonry and bridging in the District of Columbia and city of Washington. A temporary connection will be made with a street railroad until the tunnel is completed. The terminus of the main line is fixed at Pope's Creek, some distance below Acquia Creek, and nearly on the air line between Baltimore and Richmond. A good route and a charter have been obtained for an extension from Pope's Creek to Richmond.

#### ELECTIONS AND APPOINTMENTS.

—At the recent election of Directors of the Toronto, Grey & Bruce Railway (Canada), Hon. John McMurich, John Gordon, George Laidlaw, John Shedden, George Gooderham, R. McMaster, H. S. Howland, John Morrison, and Hon. D. L. McPherson were chosen.

—Mr. R. S. Elliott, who has been appointed Industrial Agent of the Kansas Pacific Railway, in a circular which he has issued defines the duties of his novel office as follows:

"First. To investigate, and to some extent test, the capabilities of the country along the line of the railway, for the production of trees and plants, from the present western limits of settlement in Kansas to the settlements of Colorado.

"Second. To superintend plantations of forests in Kansas and Colorado for the future uses of the railway.

"Third. To compile exact information, where possible, in regard to water supplies for settlements, in the region traversed.

"Fourth. To aid in diffusing reliable data in regard to the actual condition of the plains, and their adaptation to economical uses.

"To assist in this work, intelligent gentlemen are respectfully requested to communicate to me such facts and suggestions as may in their opinion be useful. I wish the aid of the best minds of the country. The object is, the redemption of the great plains. The result will be the spread of happy homes and civilized humanity over the now treeless waste.

"My address is 'Kit Carson, Colorado'—a station on the Kansas Pacific Railway, 487 miles west of the State line of Missouri."

—The following directors of the Memphis & Charleston Railroad Company were re-elected on the 14th inst at Memphis: George P. Beirne, Joseph C. Bradley, Robert C. Brinkley, James I. Donegan, Albert H. Jones, Pitzer Miller, John D. Rather, William B. Waldran, and Moses J. Wicks.

—At a meeting of stockholders of the Indianapolis, Peru & Chicago Railroad Company, held at Indianapolis on the 18th inst., the following directors were elected: David Macey, Indianapolis; William Cutting, New York; Heyward Sutting, New York; Thomas P. Haughey, Indianapolis; V. T. Malott, Indianapolis.

The following officers were subsequently elected:

President and Superintendent, David Macey; Secretary, A. B. Southard; Treasurer, V. T. Malott; General Freight Agent, L. N. Andrews; General Ticket Agent, C. A. Linch.

The branch road from Laporte to Michigan City will be completed and in running order by the 1st of December.

—Wm. G. Swan, for thirteen years connected with the Chicago & Northwestern Railway, for some time past as its agent at Sioux City, has lately accepted an appointment as Assistant General Freight Agent of the Milwaukee & St. Paul Railway, with headquarters in Milwaukee.

—The stockholders' meeting of the Boston, Hartford & Erie Railroad Company was held in Boston on the 14th and 15th inst. On the second day the stock vote

ordered the day before on the question of accepting the amendment making the number of directors fifteen was announced by George Ellis, the chairman of the committee to count the votes, as follows: Whole number of votes, 71,423; necessary for a choice, 35,712; for the amendment, 56,159; against the amendment, 15,264.

On motion it was voted by the meeting that fifteen be the number of directors. After some skirmishing the New York ticket was elected, as follows: E. C. Sherman, Otis Norcross, Matthew Bolles, Charles R. Chapman, Charles C. Vanzaadt, Homer Ramsdell, Percival L. Everett, Lyman Nichols and Frederick A. Lane. Of these only Sherman and Nichols were members of the old board. Ramsdell and Lane are directors of the Erie Railway Company.

—The directors of the Boston, Hartford & Erie Railroad Company have chosen Frederick A. Lane President.

—At the annual meeting of the stockholders of the Baltimore & Potomac Railroad Company in Baltimore on the 9th inst., the following gentlemen were elected directors for the ensuing year: Governor Oden Bowie,

Col. Samuel Cox, Hon. Eli J. Henkle, C. G. Miller, Col. William D. Bowie, William T. Walters and George B. Roberts.

—At a recent meeting of the Toronto & Nipissing Railroad Company the following directors were elected: William Gooderham, Jr., J. Gould, J. C. Fitch, T. C. Chisholm, J. Shedden, J. E. Ellis, Geo. Laidlaw, Hugh Mc Donald, and J. Gardner. A meeting of the directors was afterwards held, at which Mr. Shedden was elected President, and Wm. Gooderham, Jr., Vice President.

—Col. A. G. Gawer has been appointed Superintendent of the St. Joseph and Kansas City divisions of the North Missouri Railroad, with headquarters in St. Joseph. These divisions are the line from Moberly to Kansas City and the newly leased line from Richmond to St. Joseph. Col. Gawer was Superintendent and Chief Engineer of the latter while being constructed as the St. Louis & St. Joseph Railroad.

—C. W. Fisher, who has been for some time Superintendent of the Denver Pacific, since the completion of the Kansas Pacific has had added to his duties the superintendence of 106 miles of that road, so that his division is now 212 miles long.

#### TRAFFIC AND EARNINGS.

—The business of the Denver Pacific Railway for August, shows the following:

Total amount of freight carried.....	7,308,363 lbs.
" " " received at Denver.....	4,719,776 lbs.
" " " forwarded from Denver.....	1,644,776 lbs.
Passengers carried north.....	690
" " " south.....	910
Total passengers carried.....	1,570

—The traffic receipts of the Grand Trunk of Canada for the week ending August 27 amounted to £30,300, against £31,600 in the corresponding week of last year, showing a decrease of £1,300.

—The traffic receipts of the Great Western of Canada for the week ending August 26 amounted to £14,309, against £14,637 in the corresponding week of last year, showing a decrease of £328.

—The estimated earnings of the Kansas Pacific Railway for the second week in September, as detailed by Mr. S. T. Smith, Auditor of the Company, were:

From Freight:	
Ordinary.....	\$48,000 00
Government.....	50 00
Total.....	\$48,500 00
From Passengers:	
First Class.....	\$23,270 00
U. S. Troops.....	900 00
U. S. Mails.....	1,631 87
Total.....	\$25,721 87
Total for the week.....	\$74,221 87

#### MECHANICS AND ENGINEERING.

Heavy Grades Again.

The steep grades of 308, 278, 250, and 232 feet to the mile on the Chesapeake & Ohio road, rather detract from the wonder with which engineers used to regard the maximum grade of the Baltimore & Ohio road, 117 feet to the mile. Utilising the entire weight of the locomotive for tractive purposes makes possible the use of exceptional grades, and although this lifting of heavy weights over steep hills rather detracts from the commercial value of roads where the heaviest part of the traffic is against the grade, it is comparatively of little consequence where the opposite is the fact. Some of the best paying railways in the country have quite heavy grades: The Boston & Albany, 83 feet, the Pennsylvania Central, 93 feet, and quite a number of others having grades running from 70 to 80 feet. The six-wheel engines with the pony trucks on the mountain section of the Lehigh Valley road walk up grades and pull loads that rather astonish managers who are using engines of old designs on comparatively level roads.—*American Railway Times*.

Glass Passenger Cars.

F. M. Horning, of Corry, Pa., makes the following proposition in a letter to the *Scientific American*:

"Our railway coaches ought to be made with glass sides for several reasons. The peep-holes, so common now, ought to give place to windows 48 x 30 inches, consisting of panes of glass 15 x 48 inches, in sashes arranged to slide by one another. One such window to a seat, with curtains of some comparatively inexpensive material for summer, while something warm and heavy might be provided for winter, would be far better than the clumsy shutters in use, besides being more homelike and tasty. Such a coach would be lighter in both senses. What a grand view would be afforded to the traveler from such coaches! How imperfect the perspective now—how perfect then. Now we must be content to gaze on panel, veneer, and daub, then we might gaze with unobstructed vision on all the light and beauty with which the Father has adorned this fair land



of ours. All of the exhilarating effect of buggy riding is lost in these cages—cages, yes, cages of death in so many catastrophes.

"With the sides of glass few would be left in the wreck when it reached the bottom of some declivity, to scorch and burn as at Angola.

"With the sides of glass, many would have escaped who sank beneath the surface of a river, to rise only in death, in cars transformed as quickly into capacious coffins.

"With the sides of glass, how easily the elbows or the foot might open an avenue of escape in every case of danger. Many firemen and engineers have escaped death by jumping from their cars, when to remain would have been a useless sacrifice of life."

#### Wear of Taylor Steel Tires.

On the Rutland & Burlington Railway there are in use some 125 cast steel tires made by Messrs. Taylor Brothers & Co. This is a mountain road with steep grades, making it necessary to use considerable amount of sand to prevent slipping; but in spite of this, these tires show an average run of 75,000 miles to 1-16th in. wear. This is a remarkably good report, and the officers of the road say they have found no soft spots or other defects so annoying to master mechanics.—*American Railway Times*.

#### St. Louis Bridge.

The work on the bridge is progressing satisfactorily, except that some delay still exists in consequence of the non-arrival of sufficient quantities of granite to keep all the hands at work. The caisson for the east abutment pier building at Carondelet is not yet completed. It is expected to be completed and ready to be launched from the ways in about three weeks. The dimensions are, length, 83 feet; width, 80 feet, and 22 feet high. The sides and ends are in the shape of a letter "V." The dock or roof of the air chamber is five feet thick of solid timber, all built up of white oak, averaging fourteen by sixteen inches on the end. These are bolted together so that every course of timber lies diagonally across each other. The interior of the caisson is divided into three compartments, one of which is twenty-four feet wide, and the other two sixteen and seventy feet long. The partitions separating the compartments are of the same massive proportions as the rest of the work, being in the largest place ten feet thick. The exterior of the caisson is sheathed with half-inch boiler iron; and on the wooden deck is built up an additional deck of five feet in height, of iron. Through the deck leading into the chamber are three shafts or openings. The main or centre one is twelve feet diameter and has connected with it two air locks, each ten feet diameter. The other two wells are ten feet in diameter, with one air lock of the same size to each. These wells and chambers are all constructed of the half-inch boiler irons.

Nineteen sand-pumps and a net-work of iron pipes for the purpose of distributing the air to the interior will be placed in the caisson. This mode of supplying air is an improvement on the previous caissons, and was suggested by the difficulties encountered in sinking of the pier caissons.

Every piece of timber and iron is firmly bolted and secured in its place by several thousand one and a half inch bolts, a large number of which are ten and twelve feet long. The quantity of timber used in its construction is estimated to be nearly one million feet, and about five hundred tons of iron is used. For the purpose of floating this mass of wood and iron, a temporary bottom is secured to it which will be removed when it reaches the place for its immersion. The delay in its completion is in consequence of the timber not being delivered promptly. The gentlemen in charge of the work at the place of its construction at Carondelet, are, of the wood work, Mr. John Dunlap, and of the iron work, Mr. Nelson.

When this caisson is immersed, the sides will not be built up as was done at the east pier, but the masonry will stand in the water without covering. This answers just as well as carrying up the iron enclosure and all that is necessary is to provide for the proper lining at the shafts so as to prevent leakage. *St. Louis Republican*.

#### Cheap Tram Roads.

At the present time, when the construction of cheap communication by tram and rail ways is attracting so much attention, the system of tram railways by Mr. Page, engineer of Westminster and Chelsea Bridges, and formerly acting engineer of the Thames Tunnel, and which has recently been again brought under our notice, appears to us well adapted for all localities where steep gradients have to be surmounted, and where economy is the order of the day in the construction of these lines. Thus for light railways on the extensive estates of the noblemen and landed gentry in Scotland and other parts of the United Kingdom, it would be found useful in working up gradients of 1 in 10, and even steeper, as the

material of the estate, whether wood or stone, would be used for the trams on which the driving wheels of the locomotive would move, the economy will be very apparent. This principle is further adhered to in the very light rail which is used for the carriages. The application of serrated driving wheels, working on the tram with the greatest adhesion, is the original merit of the system, the rough surface preventing the slipping of the wheels, while the load itself moves smoothly on the iron plate or rail inserted near the edge of the tram. The gauge may be from 2 feet to 4 feet 8½ inches, as required. Three feet would be a desirable gauge—but that must depend upon the object and uses of the railway. A light rail 3½ lbs. per yard, reversible, so that it would be 15 lbs. for each surface, would be well adapted for light trucks for minerals, coals, agricultural produce, &c., and the locomotive on the tank principle, engine and tender on one frame, 12 to 14 tons weight, without any shrieking, puffing, or nuisance of any kind, would not be objectionable. Mr. Page proposes that the locomotive shall be kept at work on the line with very frequent trains, so as to secure the greatest economy.—*London Railway News*.

#### Viaducts on the New York & Boston Air Line.

The Boston Post in an article on the progress of this new railroad has the following:

"The viaducts and bridges upon this line are to be of the best quality of wrought iron, submitted to a test thirty per cent. greater than those of the Pennsylvania Central road. Seven miles from Colchester is the celebrated Lyman viaduct, named in honor of the President of the road. This crosses the Dickinson stream, and it is certainly one of the greatest pieces of engineering skill in this country, as it is the first of its kind. The length of the viaduct is 1,108 feet and 143 feet high from the foundation to grade. The bridge is to rest upon hollow iron piers, of which there are thirty-six, each thirty feet apart, in addition to the two massive stone abutments. The masonry is completed, the iron is fast arriving on the ground, and one bent is already set up, sufficient to show the character of the work. Every precaution will be taken to insure safety over this structure as all others. The Phoenix Iron Company, of Pennsylvania, furnish the iron, which is all paid for. The cost of this viaduct is \$200,000. The Rapallo viaduct over Flat brook, one mile west of the Lyman, was next in order—it is 1,400 feet long and 60 high, and is being built by E. N. Myers, contractor; and another over Black Ledge River, on A. D. Myers' work, is 230 feet long and 50 feet high, and of the same material and pattern as the Lyman.

"All viaducts and bridges are built with a view to the laying of a second track whenever it shall be required. In the heavy cuts, the road-bed is made for double track, so as to use all the surplus earth and rock taken from the cuttings. The viaducts are under charge of Maj. R. P. Tommasik, an Austrian engineer of experience, and Maximilian's chief of staff in Mexico."

#### Iron Railroad Cars.

Mr. E. Ganjot, a French engineer, now of Tauragus, Pa., writes as follows to *The Hub*:

"Railroad cars with the main frame of iron have been in use in Europe over fifteen years. In 1859 I had charge of the car and railroad machinery department of the largest establishment of the kind in France; and in that year we received an order for 500 ten-ton coal cars, with main and box frame of T, double T, N, and V iron, only the floor and side boards being of wood. The design had been taken from the Northeast Railroad Company of Switzerland, which had those cars in use for four years previous. The ten-ton coal cars on the Continent are similar in height and size to the coal cars used in our coal regions, except in the running gear. In 1862 I built some coal cars for Prussia; and they were all iron, bottom and sides being made of heavy sheet iron. In 1863 we received an order from the Northeast Railroad of Switzerland, for 250 coal cars, 200 cattle cars, and 10 baggage cars, all of iron. The cattle, baggage and passenger cars used in Switzerland are of the same kind as those used in the United States, with same running gear, and four and six wheel trucks. I left Europe in 1864, but went back in 1867, at the time of the Paris Exposition, when I saw cars of all kinds and descriptions made wholly of iron. While on a tour to Switzerland I visited the offices of the Northeast Railroad Company. They were much pleased with their iron cars, and have built over 2,000 since that time. I saw some of the cars built by me, and they looked like new ones. The railroad official told me that they stand break and collision better than wooden cars, as all that gives way are the rivets and bolts, which can easily be replaced.

"I saw a great many passenger cars made of iron in all parts except the inside work, such as seats, sashes, etc. I think in this country, where the collisions are so frequent, that iron cars would be of immense value. Some railroad men here say that the iron cars are not

good, for the reason there have been so many breakdowns with those which have been tried.

"My answer to their argument is that the iron coal cars we have in use, are not built right; the main frame is of wood, and the box is iron riveted together; while the box ought to be made in segments bolted together, so in case of breakage those segments could be taken apart and straightened."

#### LOCOMOTIVE STATISTICS.

##### Michigan Central.

The following is the report of the general average of performance of locomotives on all divisions of the road for the month of August, 1870, as made by A. S. Sweet, Locomotive Superintendent:

Number of freight cars drawn one mile.....	2,646,485
Equal to cars drawn over entire line.....	9,318
Number of freight cars drawn one mile in July.....	2,975,141
Equal to cars drawn over entire line.....	8,900
Number of miles run to 1 pint of oil.....	14.01
" " " 1 cord of wood.....	81.83
" " " 1 pint of oil in July.....	18.54
" " " 1 cord of wood.....	96.78
Average number of miles run per ton by coal-burning engines.....	39.80
Average number of miles run to one ton of coal in July.....	41.53
Average of freight trains.....	21.46
Average size of freight trains in July.....	23.66
Number of gallons of oil used.....	2,251½
Number of cords of wood used.....	8,119
Number of tons of coal used.....	1,916
Number of miles run by passenger trains.....	88,950
" " " freight trains.....	117,335
" " " miscellaneous trains.....	16,951
" " " training engines.....	34,910
Total.....	252,446

##### Allegheny Valley.

Mr. G. W. Glass, Master Machinist of the company, reports for the month of July, 1870:

The number of miles run by trains was as follows:

Passenger trains.....	29,293
Freight ".....	49,377
Ballasting, &c.....	5,690
Total.....	84,360

The cost per mile run was:

For repairs.....	8.60 cts.
" fuel.....	5.08 "
" stores.....	8.08 "
" engineers, firemen and wipers.....	7.54 "
Total cost per mile run.....	21.99 cts.

Average number of miles run to

Pint of oil.....	36.63
Ton of coal.....	35.09

Thirty-one locomotives made mileage during the month. One new 34½ ton locomotive is building. The length of the road is 132 miles.

#### State Aid to Georgia Railroads.

A late number of the Atlanta *Constitution* gives the following account of the immense subsidies in the way of State credit which the Georgia Legislature has voted to various railroad companies:

Before the session of the Legislature, the State had granted aid to the extent of nearly ten millions of dollars, of which the actual endorsement has been given for \$4,016,000, as follows:

Macon & Brunswick.....	\$1,950,000
Alabama & Chattanooga.....	192,000
South Georgia & Florida.....	584,000
Brunswick & Albany.....	1,500,000
Georgia Air Line.....	940,000

To secure this the State has a mortgage of \$9,207,000 of property, with the right to take the railroads if they fail to meet their engagements.

The roads entitled to State aid up to this session were Macon & Brunswick, \$10,000 per mile for 24 miles.

South Georgia & Florida, \$8,000 per mile for 73 miles.

Brunswick & Albany, \$15,000 per mile for 235 miles.

Georgia Air Line, \$12,000 per mile for 110 miles.

Macon & Augusta, for 65 miles.

Cartersville & Van Wert, \$12,500 for 23 miles.

Bainbridge, Cuthbert & Columbus, —

Up to this time additional State aid has been granted to the following roads:

Roads.	Miles.	Aid pr mile.	Amount.
North Ga. & Tenn.....	53	\$13.00	\$690,000
North & South.....	121	12.00	1,452,000
Ringold & Harper Gap.....	19	12.00	228,000
Lookout Mountain.....	60	10.00	600,000
Memphis Branch.....	24	12.00	288,000
North Eastern.....	85	12.00	1,020,000
Atlantic & Blue Ridge.....	169	15.00	2,535,000
Augusta & Hartwell.....	130	12.00	1,560,000
Gainesville & Rabun.....	60	12.00	720,000
Macon & Knoxville.....	180	15.00	2,700,000
Indian Springs.....	65	12.00	780,000
Barnwell, Millen & Albany.....	203	12.00	2,436,000
Newnan & Americus.....	114	12.00	1,368,000
Americus & Florence.....	60	12.00	720,000
St. Mary & Western.....	120	12.00	1,440,000
Fort Valley & Hawkinsville.....	84	12.00	1,008,000
Brunswick & Albany.....	235	8.00	1,880,000
Dalton & Morgantown.....	85	3.00	255,000
18 Roads.....	1,723		\$19,851,000

It will thus be seen, if some little railroad has not escaped our attention, or two or three of them probably, that 18 roads have been aided stretching out 1,723 miles, and the aggregate of the State aid is nearly twenty millions. Add to this small sum the ten millions before granted, and we have the inconsiderable amount of THIRTY MILLIONS of dollars voted by a progressive Legislature to internal improvements in the great State of Georgia.

Two roads have received an addition of aid to what was granted before, the Brunswick & Albany and Dalton & Morgantown roads.





PUBLISHED EVERY SATURDAY.

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## Editorial Announcements.

*Correspondence.*—We cordially invite the co-operation of the Railroad Public in affording us the material for a thorough and worthy Railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

*Articles.*—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

Our Prospectus and Business Notices will be found on the last page.

## VOLUME ONE.

The present number closes the first quarto volume of the RAILROAD GAZETTE. We have given in the six months just past 632 printed pages, more than half of it reading matter, and a very large part original, including contributions from practical railroad men which, altogether, would make several ordinary bound volumes. While we have had abundant assurances from the railroad community that the paper meets their approval and is valuable to them, still it has not been so good a paper as we think they ought to have and as we would have liked to publish. But we have made at least a satisfactory beginning, and by diligent cultivation of the field we have entered we hope and have reason to believe that we shall be able to produce results more and more valuable every year. Certainly we shall do everything within our power to secure such a result. By the addition of Mr. M. N. Forney to our editorial force, we shall be able to pay more attention to and present much more original matter and criticism on subjects connected with engineering, and mechanical engineering especially. We shall continue to give contributions from practical men, and expect to be able to add to the number and value of these.

Beginning with January 1, 1871, the subscription price of the RAILROAD GAZETTE will be increased to four dollars per year, in advance. Subscriptions for one year or less with the money accompanying them will be received until that time at the old rate—three dollars per year.

## IOWA AND ST. LOUIS.

In ancient times (fifteen years ago or thereabouts) St. Louis was the chief and almost the sole market of Iowa, the Mississippi giving access to the eastern and the Missouri to the western side of that State, whose trade at that time, however, had only just begun to be important. The best route to Chicago, even from Dubuque, was by way of Alton. But the railroads have reversed this. Now almost every county in the State has a direct rail route to Chicago, and it buys its goods and sells its produce in this market. St. Louis has long claimed that it

could regain its old position if it had direct railroad connections. These have been planned on a magnificent scale, and, if all of them are constructed, Iowa will have as many railroads crossing it from north to south and tributary to St. Louis: it now has crossing it from west to east and tributary to Chicago. But the first road of this system is only just now in position to begin to compete for the traffic which has hitherto gone to Chicago. This is the Northern Division of the North Missouri Railroad, which for a year has been in operation to a point in Iowa twenty miles beyond the north boundary of Missouri, but until within a few weeks has had no connection with other Iowa Railroads. But the recent extension to Ottumwa, where it meets the Des Moines Valley and the Burlington & Missouri River roads, has given it connections with a large part of Iowa. At this point the distance by rail is 276 miles to St. Louis and 281 miles to Chicago, so that neither city has any appreciable advantage in distance. Thus all points west of Ottumwa on the Burlington & Missouri River road and northwest of that place on the Des Moines Valley Railroad (including Chariton, Red Oak, Eddyville, Oskaloosa and Des Moines) are brought as near to St. Louis as to Chicago; while all the Missouri River towns of Iowa and Nebraska heretofore have been nearer the former city by rail and have had in addition communication by water.

It has been announced that a large amount of trade has tended to St. Louis from Ottumwa since the railroad was opened, but the time has been too short to demonstrate the advantages of such a movement. The relative power of the two cities to control trade has been best exemplified by the towns of the Missouri valley, such as Sioux City, Council Bluffs, Omaha, Plattsmouth, Lincoln, etc. As we have heretofore remarked, these towns have both rail and river connection with St. Louis and only a rail connection with Chicago and that longer than the rail route to St. Louis. Yet but a fraction of their business is done with St. Louis.

It is not to be expected that the line from Council Bluffs to Chicago will permit its traffic to be diverted from it at Ottumwa, at the middle of the line; but the Des Moines Valley road has not so much to lose. Ottumwa is but 76 miles from Keokuk, and the line extends about 175 miles northwest now, and the section from Ottumwa to Keokuk will not be one-fourth of the whole line when completed. It is so happily located as to be indifferent whether its traffic goes to St. Louis or Chicago. In either case it can take it on its way.

The direction of shipments from Ottumwa from this line will be observed with interest, especially by those who have projected railroad lines across Iowa from north to south.

## AROUND THE WORLD.

We are indebted to Mr. A. M. Smith, the General Passenger Agent of the Chicago, Rock Island & Pacific Railroad Company, for an opportunity to examine some documents and a letter sent to Mr. Smith by the agent of the Peninsular & Oriental Steam Navigation Company in Hong Kong. One of these documents is a "Handbook of Information," for passengers and shippers by the steamers of this great company, which has been in operation for thirty years and has now fifty or more steamers, which are employed on the routes which connect England with Southern and Eastern Asia and Australia. It has been proposed lately to add to these another line between Australia and San Francisco. At the beginning of this year the company had eleven steamers plying between Southampton and Alexandria and Marseilles and Alexandria, six between Suez and Calcutta touching at Ceylon, fifteen between Suez and Bombay and Bombay and China, three between Ceylon and Sydney (Australia), and eleven on routes near the Chinese coast, such as Hong Kong and Shanghai, Hong Kong and Foo Chow, Shanghai and Japan, etc. The "Handbook of Information" is a little pamphlet of eighteen pages, and is a model in its way, giving full and detailed information to passengers and shippers concerning the times of leaving and arriving at every point touched, the rates of fare and freight, precisely what accommodations are covered by the fare, the connections made at the several landings with its own and other lines, the means of embarking and disembarking where the shore must be reached by boats or tenders, minute directions concerning baggage, and other matters, one paragraph stating that "the freight of a dog to India, China, or Australia is £5, exclusive of food, attendance, and the expense of transit through Egypt, at owner's risk."

Those who wish to make a trip around the world will find it convenient, and probably necessary, to make use of this company's steamers for at least a part of the way. Should they go from Chicago to San Francisco, a Pacific Mail steamer will transport them across the Pacific to

Yokohama, Japan, which is a sort of Halifax to China. Thence a P. & O. steamer will convey them southwest 1,630 miles to Hong Kong, the European city of China, a few miles from Canton. From Hong Kong, if the passenger wishes to take the shortest route, see the most water and the least land possible, he takes a steamer for point de Galle, at the southern extremity of Ceylon, distant 3,031 miles. The route is southwest by south 1,437 miles Singapore, which is on the equator and at the extremity of the Malay peninsula, then, after doubling the Peninsula, the route is nearly due west to Ceylon, and even beyond it to the mouth of the Red Sea at Aden, 2,134 miles, to and by which another steamer of the same company runs, continuing up the Red Sea 1,308 miles to Suez, whence the railroad will take the traveler to Alexandria, the P. & O. steamers not passing through the Suez Canal. From Alexandria you may go either to Southampton or to Marseilles.

But if you would see land as well as water, you will probably sail from Point de Galle up the coast of India to Calcutta, 1,315 miles, whence you may cross British India by rail to Bombay, and there take the P. & O. steamer to Suez, 2,972 miles. Your fare from Hong Kong to Suez by the direct ocean route will be \$400 in gold, and if you are aristocratic and will have a "reserved cabin" ("state-room" in the American language) to yourself it will cost you \$800. To Marseilles the fare, including passage over the Alexandria & Suez Railroad, will be \$500, and to Southampton \$520. To Calcutta the fare is \$340, and when you have crossed to Bombay, the fare thence to Marseilles will be about \$350.

A time table of the Alexandria & Suez Railroad accompanies the letter. It gives the distances between stations in miles and chains, the running time from station to station in minutes, and the stoppage at each station in minutes. The line is 224 miles and 24 chains long, and the train makes that distance in ten hours and one minute, stopping at nineteen stations. Eleven of these stops are for only one minute, two for ten, two for fifteen and one for thirty minutes. There is thus eight hours and twenty minutes of running time and one hour and forty-one minutes of stoppages. These trains (Indian passenger trains they are called) usually run in the night to avoid the intense heat of the day in that climate.

If now excursion parties are not formed for trips to Japan, China, India, Egypt, France, England and New York it will not be our fault. They can have princely accommodations all the way. We wish them a pleasant journey.

## Resignation of Mr. Phillips.

Mr. E. B. Phillips, General Manager of the Lake Shore & Michigan Southern Railway has resigned his position, to take effect on the 1st of October.

Mr. Phillips when a very young man—indeed, almost a boy—entered the service of the Boston & Worcester Railroad, now the eastern section of the Boston & Albany road. He rose step by step on that line until he became General Freight Agent. He afterwards was appointed General Superintendent of the Cleveland & Toledo Railroad, (now a part of the Lake Shore & Michigan Southern Railway). After serving in that position for some time, he went back to the Boston & Worcester Railroad as its General Superintendent. In 1865 he was elected President of the Michigan Southern & Northern Indiana Railroad Company. This position he occupied until last spring, when it was determined to separate the executive entirely from the operating department of the road, and Mr. Phillips was appointed General Manager, Mr. Horace F. Clark being elected President.

The Lake Shore & Michigan Southern Railway in its present condition is a magnificent monument of Mr. Phillips' administration. When he came to it the company had 517 miles of road, and a rolling stock inferior to that of competing lines. Notwithstanding the great advantages of the line and its connection with the excellent road on the Erie shore, it obtained less business than rivals with fewer natural advantages. During Mr. Phillips' administration the consolidation was effected with the three roads which form the line between Buffalo and Toledo, adding 341 miles to the length of the company's lines. During the same time, and chiefly by Mr. Phillips' efforts, the Kalamazoo Division was added by the acquisition of the Kalamazoo & White Pigeon and the Kalamazoo, Allegan & Grand Rapids roads, running through the richest and most populous country in Western Michigan. This was an addition of 92 miles of road. The total mileage of the company is now 947 miles.

At the same time that the road has grown greater, it has become very much better. When Mr. Phillips came to the road he immediately began a system of improvements by which the line has been gradually perfected until it is now universally recognized as one of the best built and best equipped in America. The road-bed has



been put into the best condition; wooden culverts, bridges and other structures have been replaced by iron and stone, station buildings and shops increased and improved, and the rolling stock very largely increased and wonderfully improved. The increase in traffic has corresponded with the preparations for its accommodation, and at this time the line from Chicago to Buffalo is one of the busiest in the United States. Its capabilities have been developed and its capacities made known, and few roads have so good a prospect of a continually increasing traffic.

Chicago, as well as the railroad company, has reason to be grateful to Mr. Phillips. It was due in great part to his enterprise that the fine passenger station at the head of La Salle street was projected and completed in the first years of his administration. The construction of this building prompted a series of improvements in that part of the city which have entirely revolutionized its appearance. Besides the passenger station, two large freight houses of brick and stone have been built, and the grounds adjoining filled in with sand to a depth of several feet. Large purchases of land have been made for the company, including these depot grounds, a large river front, and many acres besides. The improvements on this property have added immensely to the value of other property in the vicinity.

Mr. Phillips has earned, legitimately, a national reputation as an experienced, skillful and thoroughly honest railroad manager. He has been strict in requiring good and faithful service of his employees, first setting an example of it himself, and has obtained their respect and good will while he secured their efficiency. One of the most modest and unassuming of men, he is yet one of the best known and most respected of the citizens of Chicago. The people of this city will unite in wishing him prosperity in whatever enterprise he may engage hereafter.

#### New Passenger Station in Atlanta.

Atlanta, which was an unimportant town before the war, but grew rapidly and was an important point during the contest, was left in rather a sorry state by General Sherman—indeed, as the soldiers put it, seemed pretty nearly "wiped out." But it wouldn't stay wiped out. Peace revived it, and it seems to have caught something of the spirit of tremendous energy which characterized the armies which so long occupied it, only that its energy is creative while theirs was destructive. Its growth has been something marvellous, and would be remarkable even among Northwestern cities where rapidity of growth is not the exception but the rule. By the way, it is curious that a large number of the cities which were the scenes of active operations during the war, or were long occupied by armies, have thriven wonderfully since peace was restored. Richmond is growing, Savannah eclipses the other South Atlantic towns, Jacksonville has grown as nothing in Florida was ever known to grow before, Atlanta is the most prosperous of Georgia cities, Vicksburg has become an important city, and Memphis bids fair to become the St. Louis of Tennessee and Arkansas.

But to return to Atlanta. The particular instance of prosperity that we desire to notice is the new passenger house which is to be built there. Atlanta is the point where traffic from the North, and especially from the Northwest, diverges to the East, the Southeast, the South and the Southwest. From Chicago we can reach South Carolina, most of Georgia, Florida and a great part of Alabama most directly by way of Atlanta. Four lines center there—the Western & Atlantic from Chattanooga, the Georgia Railroad from Augusta, the Macon & Western from Macon, (with connections to Savannah, Brunswick, Albany, Columbus, and Florida towns) and the Atlanta & West Point from Montgomery and the Western and Gulf towns. Yet the passenger house is a shed which would be sufficient for a stable (in that climate) perhaps, but is neither beautiful, comfortable or convenient. But all this will be changed. The roads have accepted a plan for a new station proposed by J. P. Stidham & Co., of Philadelphia, and awarded the contract for constructing it, which has been let to J. C. Adams, of that firm. It will cover an entire block 352 feet long by 120 wide. The foundation will be of granite, the side walls of brick, and the ends chiefly of iron. The roof will be a circular truss, resting on each side on twenty wrought iron pillars twelve inches in diameter, and covered with corrugated galvanized iron. The most prominent features of the building will be four towers of varying form, two on the south end, where the trains will enter, one at the other end, where offices will be located, and a fourth surmounting a grand entrance on the west side. There will be five parallel tracks in the building. The apartments will be a ladies' waiting room, ladies' wash room, gentlemen's waiting room, gentle-

men's wash room, restaurant, kitchen, mail room, ticket offices, baggage room, and express office. The estimated cost of the building is about \$135,000.

#### Taxes on Dividends.

The recent decision of Judge Strong, of the United States Supreme Court, sitting in the United States Circuit Court at Philadelphia, pronounces illegal all taxes levied since January 1, 1870, on the dividends of railroads, banks, trust companies, savings institutions, insurance companies, and interest paid on the bonds of these companies, and taxes retained from the salaries of government officers.

The law as passed originally was supposed to provide that the tax should be discontinued after the year 1869. Congress did not renew the law by passing it directly, but added a section to the tax bill declaring that the proper construction of the old law provided for its continuance for 1870. In so doing, Judge Strong decides, Congress exceeded its powers and invaded the jurisdiction of the Judiciary Department, which alone, according to the Constitution, has power to decide upon the construction of any disputed point of any law.

By this decision, if it is not reversed, the corporations of the country will be delivered from the payment of about \$46,000,000, (according to the estimates of the Internal Revenue Bureau). The case will be carried to the Supreme Court.

#### The Tax on Passenger Earnings.

By act of Congress passed last spring, the tax of 2½ per cent. on the passenger receipts of railroads is abolished after the present month. This will be a relief of about \$3,000,000 per year on the railroads of the United States. The amount of this tax paid the last year, reported by some of the Western roads, was as follows: Chicago & Northwestern, about \$95,000; Chicago, Burlington & Quincy, \$42,958; Milwaukee & St. Paul, \$44,528; Chicago, Rock Island & Pacific, \$44,674; Chicago & Alton, \$39,789; Illinois Central, \$52,575.

#### The Tea Trade.

We learn by a recent Shanghai paper that shipments of tea have been made recently to America by way of the Suez Canal. It expresses the opinion that hereafter little tea will go to America by the Cape, but will take either the route by way of San Francisco and the Pacific Railroad, or by the Suez Canal.

#### REGISTER OF EARNINGS.

FOR THE FIRST WEEK IN SEPTEMBER.		
Chicago & Northwestern (1,157 miles), 1870.....	\$293,733 00	
" " (1,157 miles), 1869.....	283,50 00	
Increase (3½ per cent.).....	\$10,633 00	
Chicago, Rock Island & Pacific (608 miles), 1870.....	\$151,300 00	
" " (594 miles), 1869.....	144,543 00	
Increase (6 per cent.).....	\$8,757 00	
Pacific of Missouri (355 miles), 1870.....	\$59,164 57	
" " (355 miles), 1869.....	57,653 00	
Increase (1½ per cent.).....	\$1,511 57	
Toledo, Wabash & Western (522 miles), 1870.....	\$112,336 00	
" " (522 miles), 1869.....	108,976 00	
Increase (3 per cent.).....	\$3,359 00	
Cleveland & Pittsburgh (303 miles) 1870.....	\$59,938 18	
" " (303 miles) 1869.....	54,352 15	
Increase (10½ per cent.).....	\$5,586 03	
FOR THE SECOND WEEK IN SEPTEMBER.		
Milwaukee & St. Paul (336 miles), 1870.....	\$176,29 00	
" " (325 miles), 1869.....	138,2 4 00	
Increase (27½ per cent.).....	\$38,043 00	
Michigan Central (404 miles), 1870.....	\$28,649 46	
" " (399 miles), 1869.....	72,886 64	
Increase (13½ per cent.).....	\$9,762 84	
Chicago & Alton (431 miles), 1869.....	\$132,074 80	
" " (465 miles), 1870.....	128,972 27	
Decrease (3 per cent.).....	\$3,802 53	
North Missouri (476 miles), 1870.....	\$59,373 00	
" " (404 miles), 1869.....	47,730 00	
Increase (24½ per cent.).....	\$11,558 00	
St. Louis & Iron Mountain (310 miles), 1870.....	\$36,145 00	
" " (310 miles), 1869.....	30,858 01	
Increase (73½ per cent.).....	\$15,286 99	

—The Supreme Court of the District of Columbia on the 19th inst. dissolved the injunction against Whipple & Dickinson, enjoining them from using their patent for burning petroleum as fuel. This case has been a long time in court, and involves large interests, both East and West.

—The "Green Line," which runs freight cars over a large number of Southern roads, has offered an excursion to a large party of Southern merchants. They will reach Louisville on the 29th instant.

—The Maynard Machine Shop, formerly McKay & Aldus' Locomotive Works, at East Boston, burned the morning of the 20th.

## Chicago Railroad News.

#### Delegates to the Conductors' Convention.

Delegates from the different railroads which enter Chicago met at the Sherman House last Monday to make arrangements to attend the Convention of the United States Railroad Conductors' Life Insurance Company, which will be held in Philadelphia on the 5th of October.

The following delegates were present: George Hewitt, C. N. Gilmore, Illinois Central; T. M. Bailey, John A. Yates, Pittsburgh, Cincinnati & St. Louis; John Cooper, James Cooper, George H. Knowlton, Theo. Murphy, Chicago, Alton & St. Louis; J. M. Hopkins, Pittsburgh, Fort Wayne & Chicago; Lyman Page, J. P. Perkins, George Richardson, J. Lawrence, H. A. Newcomb, Charles D. George, E. A. Bross, John M. Barker, Chicago & Northwestern; George Finley, Chicago, Rock Island & Pacific; George Rogers, Michigan Central; George Alexander, Chicago, Burlington & Quincy.

The Chairman appointed Messrs. Perkins, of the Northwestern; Rogers, of the Michigan Central, and Gilmore, of the Illinois Central, a committee to make the necessary arrangements for the trip. Mr. Cleland, the General Western Passenger Agent of the Pittsburgh, Fort Wayne & Chicago Railway, extended the delegates an invitation to go over his route, which was accepted. The meeting then made arrangements to leave Chicago on Monday, October 3, at 5:15 p. m.

#### Chicago, Rock Island & Pacific.

Business is excellent and increasing, both freight and passenger.

A new sleeping car, similar in design to the Sacramento and the other coaches lately built by the company, was turned out of the shops and put on the line this week. It is one of handsomest sleeping cars ever built, but is so nearly like the others of the line which we have described that it needs no further description. Outwardly it is the handsomest of the line, being very beautifully painted.

As one of the "signs of the times," we note that a party of Chinese laborers, 68 in number, passed over this line a few days ago on their way to New Jersey, where, doubtless, they will exhibit those "ways that are dark and tricks that are vain," for which Mr. Bret Harte's "Truthful James" affirms that the "heathen Chinese is peculiar."

Another section of the Chicago & Southwestern road southwest from Fairfield will soon be opened.

#### Lake Shore & Michigan Southern.

The movement of passengers and freight at this time is very heavy, and business is altogether satisfactory.

We announce elsewhere the resignation of the General Manager, Mr. E. B. Phillips. His retirement will be universally regretted by the employees of the line.

#### Chicago & Northwestern.

The line between Lodi and Baraboo will be located in a few days. The country is extremely difficult, more so than in most mountainous districts; there are cliffs of sandstone 500 feet high and almost perpendicular, and to find a practicable route across them is not an easy task. A great many lines have been surveyed, and with some deep cuttings the divide will be surmounted from the east with maximum grades of 60 feet to the mile. When completed, the route will be the wildest and most picturesque this side of Pennsylvania. With the beautiful lakes at Madison, this picturesque line through the rocks and hills, and the scenery of the upper Mississippi between Winona and St. Paul, the new line to St. Paul will be the most attractive in the Northwest, so far as scenery is concerned.

The Iowa Midland, which the Northwestern has secured lately, will be in running order from Clinton to Maquoketa, about 30 miles, by the close of the season.

#### Michigan Central.

Under date of the 19th instant, the following circular has been issued by Mr. Sargent, the General Superintendent:

"The Michigan Central Railroad Company has this day assumed the control of the Kalamazoo & South Haven Railroad, which will hereafter be operated under its management, under the name and title of the South Haven Division. "Mr. George E. Curtiss will have immediate charge of this division, as Assistant Superintendent, in addition to his present duties, as agent of this company at Kalamazoo. "Agents will be furnished with the proper blanks, and hereafter make all remittances for ticket sales and freight collections to Oliver Macy, General Receiver, at Detroit."

—The argument of the motion in the case of the Erie Railway Company and others, against Messrs. Raphael, and others, to have the action transferred to the United States Circuit Court of New York from the Supreme Court of the Judicial District, was concluded September 21. C. A. Stewart, in behalf of the company, in answer to an argument of Choate, stated the principles of law on which they insisted that the action could not be transferred to the Federal Court, under either the act of Congress of 1789 or that of 1866. Choate replied briefly, and Justice Ingraham took the papers. The decision was reserved.

—Mr. B. L. T. Bourland, of Peoria, has got out a provisional injunction, restraining the City Council, Mayor, Police Officers, Assessors, Collectors, and all other agents of that city, from paying the expenses and cost of the banquet given to the recent railroad excursionists, and also restraining Colonel Dean from presenting his bill.







ation of the check afterwards by a claiming purchaser does not find any liability on the part of the company.

The passenger may have taken as much or as little time on his journey as he pleased, he may have availed himself of the permission of his ticket to "lay over" at the principal stations, but his checked baggage will have gone on by the first connecting train, and he may be supposed to be approaching the end of his journey. Within a few miles of his point of destination the local expressman passes through the train calling out: "Baggage for Louisville." A choice of methods of securing the baggage on arrival of the train is now offered. The passenger can give up his checks to the local expressman and receive a card with the numbers upon it, having directed the delivery of the pieces to any hotel or private house, or he may retain the checks and obtaining a carriage at the depot, take the baggage with him. More frequently the checks are given to the expressman, whose charge is a small one for the delivery, and the passenger suits his own convenience as to the means of leaving the depot for his hotel or home. The local express business is often brought into action in the first step of traveling. There are numerous branch offices in the city, to any of which the resident sends word, a few hours in advance, that baggage at a certain house should be at the Pennsylvania Railroad depot to go by the 8 p. m. train. About half an hour before the time of departure from the house the expressman appears and fetches away the baggage, giving the card receipt before spoken of, and the passenger finds it upon presentation of the card at the baggage-room awaiting his claiming it before checking.

One of the curiosities of the American railroad service is a public sale of unclaimed baggage. In May, 1868, there was a sale of the two previous years' accumulations of baggage, which had been unclaimed for more than one year in the baggage rooms of the Pennsylvania Railroad. There were 63 pieces of checked baggage without marks to designate ownership and address, or, if marked, whose owners had failed to respond, sold for account of whom it might concern. Contents unknown—no inspection allowed. Amongst these was none which externally bore striking evidence of probable internal value, for such pieces are extremely rare amongst the unclaimed baggage, and are kept much longer than one year if they appear. This sale was attractive to desperate speculators, and, as usual, the prices secured were above the value of the merchandise as a whole. This lot sold for \$370.42—about 50¢ for the then value of gold. The amount of security which the check system affords the traveler can be readily deduced from the annual reports of the General Baggage Agent (Pennsylvania Central and Philadelphia & Erie Railroads), and that of 1869 (for the year 1868), which is given with this paper, may be taken as a fair basis. The statement exhibits 47 pieces unclaimed out of 361,281 pieces transported. As nearly as can be guessed, 11 of these 47 will eventually find owners. Owners will leave baggage intentionally for three or four months, trusting on the check as security that it will be forthcoming when wanted. Passengers wander off with a hand bag or empty handed to distant cities, or to another continent, and in the fullness of time pass again through Philadelphia, and surprise the baggage master with the presentation of a check procured last Christmas, and when such persons are called to account, will explain that he came from Louisville, and ought to have taken a ticket and checked to New York, but went "straight" on to New York, and took a steamer without his trunks.

If 36 is taken as the number each year finally astray, never to be reclaimed (it is shown that 63 were the numbers for two years previously), it follows that the risk of a passenger in losing his checked baggage in the United States is 1 to 10,000. The statement of the baggage agent shows also the value of the risk of misdirection, or, more frequently, of misdirection or mistake on the part of the owners when they obtain their checks: 269 pieces were "found and returned" out of the 361,281 transported, which give 1 to 1,340 that the owner will have some trouble before he sees his trunk again. The two items of "stolen" and "robbed" from baggage show the income of this year's dishonesty of employees on the train or in the baggage rooms, while the item of "baggage stolen" exhibits some theft of a trunk *in transitu* outright. The item of damage to baggage caused by wrecks shows that for this year certainly no disastrous accident happened on the line. The baggage car generally follows the tender in the making up of the train, and in case of any collision or run off is the first to receive injury either by breaking up or by fire. The companies generally print a special contract on their ticket, limiting their responsibility to a small sum of money—\$50 or \$100—but the courts of law have uniformly decided against them to any amount for personal luggage, such as a traveler would carry, merchandise of all kinds being thrown out as a fraud in the attempt to have it transported as baggage. And the companies, through the General Baggage Agent, show the utmost liberality and courtesy in settling all claims for lost, injured, and destroyed baggage without recourse to law. The claimants, in such cases, are not always as scrupulous or as truthful as to the contents of their trunks as could be wished, and there are instances of frauds which justify some strictness of dealing between the General Baggage Agent and the particular traveler. It cannot be said that one of the merits of the checking, or express system, is that tenderness of handling of luggage which the traveling community desires, but the consideration paid to a trunk is about the same in all countries, and the American porters are sometimes irreverently called "baggage smashers."

Annexed is the statement of baggage department for the year ending Dec. 31, 1868:

Number of pieces of baggage transported during the year 1868	361,281
Number of pieces of baggage estrayed, found, and returned to owners	269
Number of pieces of baggage remaining unclaimed	47
Amount paid for articles stolen from baggage	\$40 00
Amount paid for damage to baggage caused by wreck	1 1/2 00
Amount paid for baggage stolen	139 75

Amount paid for Little Miami Railroad or Pennsylvania Railroad proportion for baggage robbed between Philadelphia and Cincinnati	240 34
Amount collected for extra baggage	7,443 73
—Engineering.	

#### Car Painters' Association.

To the Master Car Painters of the United States.

The undersigned having consulted together, the idea was conceived that, to further the interests of our craft, the best plan that could be devised would be to form an association, composed of Master or Foreman Car Painters, the object of which will be manifold in its bearings. First: To meet and form the association by a choice of officers to govern and direct its affairs; to take into consideration the questions of employer and employee, the rights belonging to each, and how the best interests of each can be promoted; also the many questions that may arise in relation to the art of painting in our special department; the best methods and means to be used to bring our work up to a more systematic and recognized standard; to take into a very decided consideration the many abuses we are subject to in regard to paint stock and see if we can regulate them. To counsel together exchange opinions, become better and more generally acquainted with each other, and thereby elevate ourselves and trace to a better position and recognition with kindred associations, having the same objects in view as relates to their pursuits.

The demands of the times are pressing on us the necessity of a more thorough knowledge of our trade. Rapid have been and now are the improvements in the construction of cars and engines, and in all mechanical departments associations exist and are forming in the various branches to promote the best interest of each other, and also throw a shield of protection around the members of the several mechanical departments of our land. They are recognized by the various departments, for whose interests they labor, as bodies to be respected, and their inventions and ideas of construction accepted by intelligent men and corporations.

Is there any reason why painters should not consider the situation as to the best means to be used to exalt their calling and press to the front in the race of preferment with others? Now is the time, let us counsel together. Great benefit will result by so doing if we will move intelligently in the matter.

It has therefore been deemed advisable to issue this circular, addressed to the several Master and Foreman Car Painters of the United States, that the question can be placed before them for consideration; hoping it will meet your approbation and attendance with us, as equally co-laborers in the object to be attained. As we would be pleased to know the number we may expect, will you please signify your approval of the object, and if you will be present, by addressing Joseph Hill, Jr., Augusta, Maine.

Arrangements have been made to meet in the city of Boston, at Preble Hall, No. 176 Tremont St., November 9th, at 10 o'clock.

Signed, JOSEPH HILL, JR., P. & K. R. R., Maine.  
WARNER BAILEY, B. & M. R. R., Mass.  
ARTHUR L. SCOTT, B. L. & N. R. R., Mass.  
W. H. FORD, B. & A. R. R., Mass.  
JOHN B. COX, Eastern R. R., Mass.  
SAMUEL LUNT, Fitchburg R. R., Mass.  
JAMES PLATT, O. C. & N. R. R., Mass.

#### Railroad Progress in Canada.

No better evidence could be adduced of the general prosperity of Canada, than the number and importance of the new lines of railway, which are either projected, or in course of construction. The past record of this country, in regard to this most valuable means of transportation, has been exceedingly creditable to its public enterprise and spirit. Few countries so young can boast of better railway facilities. According to the last official returns, we possessed about twenty different lines, small and great, whose united tracks extend over about 2,750 miles, and whose annual receipts were close upon \$12,600,000. But we may now be said to have fully entered upon a second era of railway development, and when all the lines are finished which are now commenced, not to speak of others, certain to be constructed, Canada will be intersected in every direction with railways.

The construction of the Grand Trunk and Great Western railways, and the several branches which lead to these chief arteries of communication, was our first railroad era. It was a period of unusual prosperity. During the years in which these roads were under construction, there must have been close upon \$100,000,000 expended—the greater portion of which was English capital. This expenditure gave a new impulse to our commerce. Trade, in all its branches, felt the stimulus, and when the roads were opened for traffic, the effect was instant and marked. Montreal started into new life with the completion of the Grand Trunk. Business flowed to the city from the west, like a stream, which has increased annually in volume to the present time. Toronto also felt the beneficial effects both of the Great Western and Grand Trunk, and indeed, the whole of the late Province of Canada may be said to have then entered upon a new state of commercial existence.

Our second era of railway building—which we are now in the midst of—promises to be quite as extensive, indeed more extensive than the first. Quite a number of new roads are now in course of construction, the cost of which will be large. First among these, we have the Intercolonial, to connect Quebec and Halifax. The length of this line will be about 560 miles, and the cost certainly not less than \$20,000,000. It is not improbable that it will be \$5,000,000 more. Then we have the Canada Central, by which it is intended to connect Montreal and the Ottawa district. Part of this line is now being built. If the project is fully carried out it will add a little over 200 miles to our railway system, which, at \$25,000 per mile, would amount to \$5,000,000. Then we have a short road from the Grand Trunk into the Madoc mineral region, and also one from Whitby to Port Perry, a thriving

ing village on lake Scugog. Coming westwards, the two narrow-gauge roads projected in Toronto, challenge attention. Both the Toronto, Grey & Bruce, and the Toronto & Nipissing, are partially constructed, and the success of both enterprises—so creditable to the spirit and liberality of the people of this city—is now certain. When finished, both of these railways will be about 100 miles in length, and, if the estimated cost of \$15,000 per mile prove to be sufficient, the expenditure upon them will be \$3,000,000. Next, we have the Wellington, Grey & Bruce railway. This road is now running to Elora, and will be open to Fergus in a few days. The length from Guelph to Southampton is 98 miles, and the cost may be set down at \$2,000,000 per mile, which would give a total of \$1,960,000. To this list may be added, one, at least, of the proposed Southern roads. The Great Western loop line from Glencoe to Canfield (162 miles), has been sanctioned by the English Board; and the Thompson line, from Fort Erie to Windsor, with a branch to the St. Clair river (in all 275 miles), has already received several large bonuses from the counties interested therein, and is quite popular throughout the Western part of the peninsula. That one or both of these roads will be made, and that immediately, now admits of no doubt, and we may therefore add at least 200 miles more to our estimated new railroads; and at the very least \$5,000,000 to the total expenditure.

The Seaboard Provinces are making good progress in railway development, but we cannot speak definitely of the various enterprises now being promoted or under construction.

Taking, then, all these different railroads, now partly under contract, and some of them partly made, the total length of them, when they are completed, will be over 1,300 miles, and the cost not far, if at all, below \$49,000,000. The effect of this large expenditure must be beneficially felt by the whole country. It will increase our business activity; it will help to open up and develop the great natural resources of the country; and it will make money plentier. It will also affect the value of real estate, and serve to increase the commercial activity and prosperity which at present exist.

Besides the different lines of new railways specified above, the construction of which, either wholly or in part, is now assured, there are a great many other projects which merit public attention. Chief among these are the North Shore Railway—the long-talked of line to connect Quebec and Montreal by the north shore of the St. Lawrence; the proposed Muskoda line, to connect that important district with the Northern railway; the Hamilton & Port Dover road; the branch from the Great Western at Harrisburg to Brantford, and several others. Before many years we believe most of these projects will be carried out, and everything points, at the present time, to the speedy construction of the Canadian Pacific Railway, which will span the continent and unite the Atlantic and Pacific oceans. From all this it will be seen that railway development is going on very rapidly in Canada at the present time. Its effects are already becoming felt. Business is more active, increasing enterprise is manifest, and property shows signs that it feels the prosperous wave. We do not fear that this will lead to the wild and dangerous speculation which followed so closely after our first railroad era, but believe the lesson which the people of Canada learned at that time, will enable them to reap all the advantages and shun the reverses—in other words, enable them to pluck the roses and leave the thorns.—*Canadian Monetary Times*.

#### The Signal System of British Railroads.

Nearly a million persons travel every day on the railways of Great Britain. At nearly every station junctions are formed with other lines, branching hither and thither in every direction. It has thus become a matter of absolute necessity that railway points and signals should be so co-related that no contradiction can occur. In the *Scientific American*, July 16, our London correspondent referred to the method in use on the English railways. We have since received from him the following particulars of Messrs. Saxby & Farmer's system, which is used in nearly every railway in the United Kingdom:

The lines from Cannon street terminus, near London Bridge, running to Charing Cross, take circular sweeps, forming a junction near the Borough Market. The lines so joined, as well as others parallel to them, run across an iron bridge, which connects the Surrey side of the Thames with Cannon street station. Along the bridge run four main lines and one engine line; in all five pairs of rails.

Between and among these lines are numerous curves, cutting across and effecting junctions with the main lines in every direction, and so furnished with points that trains can be run from any one line to any other, as may be required.

The five principal lines, as they approach the station, spread out into various branches; so that altogether nine lines enter the station, one to each of its eight platforms, and the ninth for the accommodation of locomotives. These branches have also their points; and it results that on the bridge and at the station there are in all thirty-two pairs of points, which serve to guide locomotives to and from the several platforms and along the various routes which communicate with them. The existence of all these branches necessitates signals, the chief of which number sixteen for up-lines and eight for down-lines, besides five distant signals and six subsidiary signals, making a total of thirty-five signals.

The number of operations which these points and signals have to conduct may be understood from the fact that at the most crowded time of the day eighteen trains arrive and eighteen depart within the hour. The locomotive which brings a train in is at its head and consequently at the inner end of the station. To bring the train out again, the first locomotive is detached from the inner end and another locomotive is attached to its outer end, and when it has drawn out the train, the supplanted locomotive moves leisurely out from the platform and waits quietly by to



supplant in its turn a brother locomotive, on the arrival of a succeeding train. In this way for every arrival and departure there are required two movements of locomotives; and thus in the crowded hour, no less than 108 operations of shifting points and signals have to be performed; or, on the average, one in every thirty-three seconds.

To sum up, we find that thirty-two pairs of points and thirty-five signals—some of them 200 yards distant—have to be worked, sometimes to the extent of 108 operations per hour and generally from eighty to ninety.

Across the bridge, and some fifty yards in front of the station, a platform is erected spanning all the lines at a height sufficient to clear the chimneys of the locomotives. On this platform stands a glass house surmounted by four tall poles, from either side of which project semaphore arms to the number of twenty-four. These arms generally remain in their horizontal attitude, to signify danger, and are only occasionally lowered, and that but for a few seconds, to signify that the passage is clear. With others at a distance, they command all the lines and sidings on the bridge and in the station, and every driver of a locomotive arriving, departing, or changing line, has to keep his eye steadily upon some of them, stopping without fail when their warning blocks his way, and moving without fear when they promise safety. He easily distinguishes which of the signals belongs to the line he occupies for the moment; for they are arranged to right and left, and in altitude, in the manner corresponding to the arrangement of the lines themselves. If, then, the engine-driver does his duty, and if the signals properly point it out, no accident can happen.

Climbing by an iron ladder to the signal platform, we enter the glass house, which is about fifty feet long and six feet wide. One half of the width is occupied by a row of strong iron levers standing nearly upright from the floor, and placed at equal distances along the one side of the apartment; the rest of the width forms a gangway or passage from end to end for stalwart and serious-looking men, whose time is entirely occupied in looking through the glass side of their cell, and pulling this way or pushing that way some of the levers which are arranged before them. These levers work all the points and signals, and on counting them their number is found to be sixty-seven, viz.: thirty-two point and thirty-five signal levers corresponding exactly with the number which we ascertained before ascending the platform. Every lever is numbered, and on the floor beside it there is fixed a brass plate engraved with its name and use. Sets of them are also distinguished in a way that readily catches the eye, by being printed in strong colors. Thus all the point levers are black, the up signals are red, the down signals are blue, and the distant signals are yellow. The row of levers thus presents a diversified pattern to the eye which is readily caught by the parti-colored groups, and, having once got the key, distinguishes quickly and correctly between their different classes.

On examining the levers somewhat more closely, it is remarked that many of them have numbers painted on their sides, not one number only, but in some cases half a dozen or more. These numbers involve the whole secret of the safety which is secured by the mechanism. The signal man cannot open the points to one line and at the same time give a safety signal to a line which crosses it. When he gives a clear signal for a main line, he cannot open a point crossing to it; when he gives a clear signal to a crossing, he must show danger for all the lines which it crosses. And this is the meaning of the numbers marked on the different levers: No. 10, let us suppose, has 5, 7, and 23 marked on its side. He may pull at No. 10 as long as he pleases, but he cannot move it till Nos. 5, 7, and 23 have first been moved; and so throughout the whole system. No signal lever can be moved to safety unless the point levers, corresponding to it, have first been moved; and no point lever can be moved while there stands at safety any signal lever that ought to stand at danger. Every lever is under lock and key, each being a part of the key which unlocks some of the others, and each forming a part of the lock which secures some of the others against possible movement, while each is at the same time subject to the control of all those which are related to it.

This result, complex and difficult as it seems, is achieved by mechanism of great simplicity and beauty. Immediately under the floor of the platform, and just in front of the levers, are arranged several series of vibrating and sliding bars, somewhat like the tumblers of a lock placed horizontally. These bars have projections here which stand in front of certain levers as obstacles to their motion, or notches there which permit certain levers to travel. Some of them have sloping faces, such that, when a lever moves along them, it edges them to one side, and this transverse motion being communicated to others of the series, brings the proper projections or notches in front of those other levers to which the moving lever is related. Thus, by the movement of one lever, some others are stopped and some are left free; and this simple principle, carefully applied to all, works them into a system incapable of discord.

The locking apparatus of points and signals is not excepted from the general law of degradation. So skillfully, however, have Messrs. Saxby & Farmer worked out the system that the very wear of the material becomes an element of safety. The natural or normal position of all the signals, be it remembered, is that which indicates danger. If, then, through slackness of wear, the lever which works a signal should become partly inoperative, the worst that can happen is to leave the signal at danger. This may cause delay, because it may stop a train which might safely proceed, but it cannot involve danger; and throughout the whole mechanism this great principle is kept in view, to be safe under any circumstances—let cranks or slides wear, rods stretch or break, delay may ensue, but danger never.

We have stated above the number of operations that have to be performed in the crowded hour, a number exceeding one hundred; but the performance of these operations by no means tries the powers of the mechanism or oppresses the operators by excess of work, as

may be understood from the fact that a train can be diverted from one extreme line to a platform on the opposite extreme—an operation requiring the movement of ten pairs of points and of all the signals belonging to them—in the incredibly brief period of twenty seconds. To do this on the old system, there would have been required one man at each pair of points, and several men at the signals, we need scarcely say at a large expense of time and money, and at an enormous risk to the passengers.

To railway companies a system which effects so great economy of time and labor is a benefit of no mean order; and to travelers by railroad, an apparatus which guides them with all but absolute safety to their destination, is a boon which entitles its inventors to be ranked as public benefactors.—*Scientific American*.

#### PHILADELPHIA CORRESPONDENCE.

*The Master Mechanics' Convention.*

PHILADELPHIA, Sept. 19, 1870.

DEAR GAZETTE:

The Master Mechanics' Convention has met and adjourned, and we are sure the recollection of this year's session will not soon be obliterated from the minds of the members who enjoyed the hospitality of Philadelphia. We came here with a sharp-pointed, critical pen, and secretly cherished the intention of impaling with it all sorts of wind-bags, and especially the kind who on such occasions harangue unwary M. M.'s about the "dignity of their profession," and make rhetorical references to the "iron horse." All those dark designs we laid close to our censorious heart as we enrolled our name with a fierce vindictive scrawl on the register of the Continental. The clerk, with the gravity of an individual who was discharging the decrees of Fate, assigned us to No. —, to which we departed with measured stride. We wrapped the drapery of our couch about us, and dreamed we were practising at the game which Chinese jugglers play, and were impaling with sharp knives the hands and the arms and the feet of unwilling committee men. The following morning we tried to sustain the grim character we had assumed, but were met in the hall by men wearing blue rosettes, who saluted us with the gentle suavity so characteristic of the inhabitants of the City of Brotherly Love.

There gathered about us betimes white rosettes, worn by men with familiar faces. Soon we were ushered into Parlor C, where the endorsement of the ubiquitous Secretary of the convention brought to our side blue rosettes, the wearer of one of which with the most serene complaisance, adorned our editorial coat with a red decoration and drew a smile from our obdurate heart. However, we still retained our erect attitude, cherishing fierce intentions towards talking men who have nothing to say, and went to the opening of the Convention, where we made notes which we have since destroyed. After the adjournment for the day, and the comfortable formality of dinner, we were again ushered into parlor C, where an immaculate white envelope was addressed and handed to us which enclosed five still more immaculate envelopes marked respectively, Theatre, Park, Banquet, Steamboat and Rail, each an invitation to some sort of entertainment. We immediately commenced to thaw and have kept on thawing ever since, and at the present time the point of our critical pen is blunted, the ink is faded, and we are almost incapable of the mildest protest against anything. These brotherly love folks have a wonderful knack of soothing the savage breast and have practiced it ever since W. Penn slackened the bow-strings of the red Indians by his just dealings with them, down to the present day, when, by their hospitality, they make friends of master mechanics and mechanical Bohemians. We are vanquished and have surrendered and are prepared to believe that Philadelphia builds the biggest locomotives, the most comfortable cars, the best tools, steam hammers, etc., in the country—or, in fact, to credit almost anything a Philadelphian may say.

Joking aside, however, the reception which the manufacturers here gave to the members and guests of the Convention was of the most liberal character. The reports in the daily papers of each day's festivity give a very inadequate idea of the princely style of the entertainment. In these days, when superlatives are used so indiscriminately, it is difficult to find language to convey to the reader a distinct impression of what was really splendid. If there were words that would convey that idea of the banquet we would use them, but cannot think of any now which would be adequate.

The supper prepared for the wives and daughters of the members was just the prettiest sight of the kind we have ever seen. The toilets and "back hair" arrangements of the ladies seemed to our ignorant bachelor eyes all that they should or could be. Mrs. B—, Mrs. C—, and Mrs. D— induced us to reflect on our hard lot in that there was no Mrs. with the initial of our surname, whose charms might at least remotely resemble those of the ladies referred to.

The ubiquitous and thoughtful Reception Committee had provided every facility to the ladies for their enjoyment—carriages, flowers, etc.

The President of the Convention presided with the dignity and confidence of a Roman Senator. Possibly the latter feeling was produced by the reflection that if he himself was not sufficient for the occasion he could fall back on the Vice-President, who is no light Chap. (This is a joke.)

The Secretary performed his duties in a way which indicated that it is not only in personal appearance that he resembles President Grant. The Treasurer seemed to be entertaining some profound financial schemes as he leaned back in his chair on the platform, with his profoundly thoughtful face.

Of the real work of the convention we will have more to say in future. The reports of the committees were most of them prepared with much care, and the discussions called out a great deal of information. There was, of course, some bosh talked and reported—there always is on such occasions—but altogether there were fewer irrelevant words than usual in conventions. Some care should be taken to call out discussion. Several subjects and the reports of the committees on them were not discussed at all, chiefly because each member apparently waited to hear the views of some one else. Many of the men whom we wanted to hear from most did not speak at all. It would be a good plan, we think, for the President to call out by name the members who have made anything a specialty, e. g., Jauriet's views on swing-trucks would have been extremely interesting; Hayes on tube joints, or Wells on dead weight, could each have contributed valuable information on these subjects because they have each given one of them special study. No member should be allowed to speak twice on the same subject until all the other members who desire to speak have spoken.

Some reform or amendment to the present organization seems to be necessary to economize time. Many things which now come before the whole convention and occupy its time could just as well be disposed of by a committee. There is nothing of which members will tire so soon as routine business, and the meeting will always thin out if there is no business of importance up for consideration. If an executive committee of, say five members, were appointed, they could dispose of most of the business which now comes before the convention, and which is only of personal and not general interest. Much more time would then be appropriated to the legitimate work of the Master Mechanics. F.

#### What Constitutes a Contract to Carry Time Freight—Authority of Agents to Make Such Contracts.

The recent case of Strohn and another vs. The Detroit & Milwaukee Railroad Company, (23 Wis., 126,) was an action for damages accruing to the plaintiffs from a failure of defendant to carry goods of the plaintiffs from Milwaukee to New York, and deliver them at the latter city within fifteen days, as it is alleged that the defendant contracted to do; also for damages resulting from improper handling, &c. This case was decided for plaintiffs in the lower court. In the Supreme Court this decision was reversed. The essential part of the opinion delivered by Judge Cole is given below. After deciding that certain exceptions to the general charge were too indefinite for action, it continues.

We cannot, therefore, reverse the judgment for this objection to the charge. But the accusation is sufficient to raise the question as to the rejection of certain instructions asked by the defendant, and we think the first instruction asked and refused should have been given. That instruction was as follows: "Before the jury can find a verdict for the plaintiffs in this case, they must find the fact that there was a contract, on the part of the company defendant, to carry the goods in question through to New York, within fifteen days from the date of their delivery to defendant at Milwaukee; mere statements, that the ordinary time of carriage was from ten to fifteen days, if honestly made and without intent to deceive, will not be sufficient to overrule the within contract."

It was claimed by the plaintiffs, that the railroad company, by its agents, has entered into a contract to transport certain property belonging to them from Milwaukee to New York within fifteen days. The defense was, that the company had made no time contract, but that certain bills of lading, or receipts introduced on the trial, contained the true conditions of the contract. The General Freight Agent of the company at Milwaukee stated that one of the plaintiffs came to him to learn at what rates they would undertake the carriage of the goods by his line, saying that he (plaintiff) would have to give bonds for the liquors, and that it would require they should be got to New York within a month, and then asked if the witness would guaranty the transportation in that time; that he replied he would not guaranty any time, but the usual time in which freight went through was fifteen or twenty days. Of course it was material for the plaintiffs, in order to maintain the action, to show that there was a contract on the part of the defendant to carry the goods to New York within fifteen days from the date of their delivery in Milwaukee.



This was their case. And the instruction was, that the jury must find the fact that such a contract was entered into, and that mere statements that the ordinary time of carriage was from ten to fifteen days, if honestly made, were not sufficient to show such a time contract, nor to overcome or destroy the presumption which would otherwise arise upon the bill of lading. It appears to us that this was a proper instruction to give the jury, and that it was pertinent to the testimony. The bills of lading were before the jury. And the main question was whether they constituted the real contract between the parties, or whether there was a different parole contract made before the bills of lading were given. And it is clear that mere statements by the agent that the ordinary time of carriage was from ten to fifteen days would not be sufficient to show such parole contract, nor overcome the effect of the bills of lading or receipts as evidence of the real contract. It is said that the instruction was not technically correct because the words "within contract" are used at the close. These words obviously refer to the bills of lading or receipts which had been offered in evidence. We do not think the instruction could have been misunderstood by the jury.

Another question discussed upon the argument was, whether it was within the scope of the authority of the freight agent at Milwaukee to make the time contract alleged. The County Court held in effect the law to be, that if the agreement to transport the goods as to time was within a reasonable time, then it was within the scope of the employment of the agent to make the contract and that it would bind the company.

It is claimed that this view of the law is erroneous. For, it is said, admitting that the local agent might contract for the transportation of goods within a reasonable time, yet when he contracts to deliver within a specified time, he imposes upon the company an obligation greatly beyond the liability which the common law imposes upon a carrier; that in the latter case nothing will excuse, not even an impossibility of complying with the contract to deliver within the time, nor an act which would excuse a delivery when the contract was to deliver within a reasonable time. We do not understand, however, that when a railroad company by its agent agrees to deliver goods within a prescribed time, it becomes an absolute insurer of the goods, and must deliver at all events or pay for the property. We suppose if the goods were destroyed by an act of God or the public enemy before the time for delivering them expired, this would excuse the carrier on the special contract.

The parties are presumed to contract with reference to the responsibility which the common law imposes upon the carrier in ordinary cases, the carrier assuming the risk in respect to the time. Such, it seems to us, is the extent of liability assumed by the extent of special agreement. And with this understanding as to the meaning and obligation of the time contract alleged to have been made, we think the County Court was correct in holding that it was within the scope of the employment and the duty of the agent to make it, and bind the company.

#### The Manufacture of Bessemer Steel.

Mr. R. W. Raymond, the United States Mining Commissioner describes the process of manufacturing Bessemer Steel in the works of John A. Griswold & Co., at Troy, as witnessed by the members of the American Association for the Advancement of Science:

##### HOW THE WORK IS DONE.

But I set out to give you rather a description of the works than a discussion of the method. A large party of us availed ourselves, the other day, of the cordial invitation of Mr. A. L. Holley, the manager of the Bessemer works of John A. Griswold & Co., to witness a Bessemer "heat." As we entered the converting-room, 110 by 90 feet in size, with a lofty roof, the workmen were engaged in hoisting out of the moulds the glowing ingots from a previous heat, and depositing them on the sandy floor to cool, or loading them upon a railway truck for removal. The lifting was performed by cranes, which seemed to operate without direction, and with almost human intelligence, now descending and now rising or turning, as the handling of the 1,400 pound ingots required. Soon we noticed at the farther end of the room an elevated platform, with a railing, behind which was a row of brake-wheels, like those on a railroad car. Here stood several workmen, their hands upon the wheels, and the vigilant eyes of each upon the distant crane, which it was his business to control and guide. Thus, with a touch of the hand, the power of the hydraulic machinery was communicated to the lift. The pressure on the water used in moving the seven lifts and cranes and the two huge converters, is 300 pounds per square inch. It is not too much to say, that without the aid of hydraulic machinery, the Bessemer process would be economically impracticable.

##### THE CONVERTERS.

Our attention was at once attracted by the two five-ton converters. It is difficult to describe these so as to give a clear notion to one who has not seen them, but I will make a desperate attempt. Imagine a huge iron vessel, 14½ feet high and 9 feet in diameter externally, cylindrical in form at the middle, and contracting in hemispherical curves above and below. The lower hemisphere is truncated, giving a flat bottom, say five or six feet in diameter, of which more presently. The upper hemisphere terminates in a large neck inclined sidewise, so that a flame issuing under pressure from the mouth would not be vertical, but obliquely directed; and, when the converter is in an upright position, the flames will enter the chimney, guarded by a hood. The whole vessel has a rude resemblance to a pear. It is supported by heavy trunnions on each side of the centre, and revolved upon these by hydraulic power. A boy at one of the wheels on the remote platform before mentioned, swings the ponderous mass about its axis with ease, performing, by the aid of machinery, the work of fifty men.

We may consider the converter as a large iron bottle, with its neck awry, lined with a foot of refractory silicious material, and rotating at will upon an axis at right angles with its length. It is in this bottle that the melt-

ed pig-iron is to be exposed to a fierce agitation and oxidation by means of a blast of air, and thus, the carbon and silicon being burned out of it, converted into malleable iron. Evidently the only place where the blast can be introduced is through the trunnions, since these are the only points in contact with the solid supports. Accordingly, the trunnion is hollow, and a passage from it runs down the outside, looking like a strong rib in the iron surface, to the bottom, where it communicates with the tuyeres. The bottom of the cover is moveable, (an improvement introduced to facilitate repairs by Mr. Holley,) and when taken out looks like a great plug of fire brick, two feet high, resting upon a cast iron disk. The tuyeres, or nozzles for the blast, are imbedded vertically in the lining, and present ten groups, each containing a dozen three-eighths inch holes. The aggregate area of these openings is equal to that of a single tuyere 4.1 inches in diameter, but the thorough agitation produced by dividing the blast secures much greater useful effect. The pressure of the blast is twenty-five pounds per square inch. "This mechanical action," says Mr. Holley, "the numerous and violent air-blasts as a means of promoting the chemical reaction, is the essence of the Bessemer process."

When we arrived, one of the great converters was turned on its side, and we could see into its red throat. It was cooling down a little, preparatory to the removal of a burned-out bottom and the insertion of a new one. The other was moderately spouting fire, undergoing the reverse process of heating up, preparatory to a blast. In a few minutes the interior was hot enough, and the unwieldy monster, turning its mouth downward, vomited out the glowing coals which it had been digesting. Then it turned upon its side, and the end of a trough was brought opposite its fiery lips. This trough we could trace back, up a steep incline to the half distinguished breast of a cupola furnace on the floor above. An instant more, and a white stream of molten iron comes leaping down with coruscating showers of starry sparks, and plunging into the mouth of the converter. (The position of the vessel at this time prevents the charge from running into the tuyeres before the blast begins. Afterwards the pressure of the air itself keeps the passages clear.)

##### INTENSE HEAT AND LIGHT OF THE BLAST.

Then the blast was let on, and the converter swung back to a vertical position. A tongue of white flame came roaring out of the mouth, dazzling our unaccustomed eyes. But neither the brilliancy nor the temperature of the flames was as great at first as they became shortly after. The silicon of the pig oxidizes first, without very intense flame; but as the graphite, and especially the combined carbon, begin to burn also, the heat rises to some 5,000° Fahrenheit, and the light is so brilliant as to cast shadows across full sunshine. A professor in our party had brought a spectroscope, through which we examined the flame with curiosity. The principal line indicated was that of sodium, which must have been due to the material of the lining. Some other lines flashed out momentarily, now and then, and disappeared, masked in the continuous spectrum of the white-hot gases.

In fifteen or twenty minutes the marvelous illumination ceased more suddenly than it had begun. The volume and brilliancy of the flame diminished together with startling rapidity. So great is this almost instantaneous change, that it can be discerned 'in the night time,' says Lieutenant Dutton, "at a long distance from the foundry, and from any position commanding a view of the tall chimney, or even of the glare from the doorways, no direct view of the flame being necessary." This change of the Bessemer flame is still a puzzle to chemists. It does mark, it is true, the elimination of most of the carbon, but not of all; and it is inexplicable that the combustion should cease so suddenly while there is yet fuel left. Theory apart, however, the critical moment in practice is indicated by this change. When it arrives, the blast is stopped, the converter is turned upon its side, and 600 pounds of melted spiegeleisen are turned into it, as the pig was previously charged. The reaction is instant and violent. The manganese of the spiegeleisen combines with any sulphur that may remain in the bath, forming compounds which pass into the slag. It also decomposes in the slag silicates of iron, taking the place of the iron and returning it to the bath. Finally the carbon and manganese together reduce the oxide of iron formed during blowing, which would destroy the malleability of the iron.

##### THE DISCHARGE.

All this is done in shorter time than I occupy in describing it; and now the gigantic converter, like a monster weary with drinking boiling iron and snorting fire, turns its mouth downward, and discharges its contents into a vast kettle, or ladle, brought underneath for the purpose by one of those intelligent cranes which stand around so silent and so helpful. The ladle is swung over the moulds, and the white, one would almost say transparent, metal is drawn off into these through a tap-hole in the bottom. The heat is over. Five tons of cast wrought-iron, (or soft steel, if you will,) have been made in twenty minutes. The actual production of these works is 1,000 to 1,200 tons of ingots per month, which is nearly twice as much as that of an English plan of the same capacity of converter. The difference is due to the admirable arrangements and improvements of Mr. Holley, which greatly reduce the loss of time in repairs and handling. The number of workmen now employed is 200. The capacity of the whole works, when the blooming-mill is completed, will be about 18,000 tons of blooms per year.

#### Railroad Earnings for August, and from January 1 to September 1.

The results which we ventured to anticipate in our last article on railroad earnings, published August 13th, have been fully realized so far as regards the increase of traffic during that month. All the prominent roads report earnings for August, which show an increase, more or less important, over the same month of 1869. The

Chicago & Northwestern road shows an improvement of \$208,240, while the same road during the previous months of this year has shown a material falling off in traffic, or rather in gross receipts, from causes which are adverted to in the annual report of the company, published to-day on another page. Milwaukee & St. Paul shows an increase of \$135,473, of which \$95,304 was gained in the last week of the month; Rock Island an increase of \$75,172; Illinois Central, \$19,904; Toledo, Wabash & Western, \$16,185; Ohio & Mississippi, \$25,750; Central Pacific, \$204,186 on its increased mileage, and with the figures from gold to currency standard in its figures for this year. Other roads show various differences, as may be seen in the table below:

EARNINGS FOR AUGUST.				
	1870.	1869.	Inc.	Dec.
Central Pacific.....	\$204,186	\$511,751	\$29,186	\$...
Chicago & Alton.....	5,174	463,231	7,818	...
Chicago & Northwestern.....	1,248,213	1,37,973	20,240	...
Chicago, Rock Island & P. Clev'd, Col., Ind. & Ill. ....	56,100	4,328	7,177	...
Cleveland & Pittsburgh.....	319,012	339,611	20,599	...
Des Moines Valley.....	308,153	254,148	3,005	...
Illinois Central.....	85,271	65,048	30,223	...
Ind., Ill. & Lafayette.....	861,357	841,263	19,094	...
Marquette & Cincinnati.....	177,777	189,759	12,064	...
Milwaukee & St. Paul.....	118,407	29,378	10,981	...
North Missouri.....	661,026	525,547	135,473	...
Ohio & Mississippi.....	229,089	155,586	73,503	...
Pacific & Missouri.....	3,071	275,230	25,750	...
St. Louis & Iron Mount'n.....	248,194	2,215	80,679	...
St. Louis, Alton & T. H.....	123,00	69,167	53,832	...
Toledo, Wabash & West'n.....	167,375	165,561	1,815	...
Total.....	466,181	4,246	6,185	...
Total.....	\$7,228,632	\$6,226,340	\$1,45,292	\$43,634

Earnings for the first week in September, so far as they have yet come to hand, are generally favorable, and indicate on many of the roads a fair improvement over the same month of last year. They are as follows:

FIRST WEEK IN SEPTEMBER.				
	1870.	1869.	Inc.	Dec.
Chicago & Alton.....	\$123,425	\$125,139	...	\$1,714
Chicago & Northwestern.....	298,733	283,050	\$16,683	...
Chicago & Rock Island.....	15,300	14,545	7,555	...
Milwaukee & St. Paul.....	108,221	112,511	4,290	...
North Missouri.....	77,598	63,189	14,409	...
Pacific of Missouri.....	89,164	87,638	1,526	...
St. Louis & Iron Mount'n.....	39,845	30,344	9,501	...
Toledo, Wabash & West'n.....	112,378	108,976	3,402	...

For the purpose of showing what the earnings of a few principal roads have been in the month of September for two years past, thus presenting the figures with which the earnings of the current month must be compared, the following table is given:

EARNINGS IN THE MONTH OF SEPTEMBER, 1869 AND 1868.			
	Sept. 1869.	Sept. 1868.	
Chicago & Alton.....	\$506,623	\$486,196	
Chicago & Northwestern.....	1,391,673	1,567,479	
Chicago & Rock Island.....	736,664	658,386	
Illinois Central.....	979,401	899,066	
Michigan Central.....	475,546	466,374	
Milwaukee & St. Paul.....	534,514	1,024,045	
Ohio & Mississippi.....	292,873	307,122	
Toledo, Wabash & Western.....	470,730	460,203	

Eight months of the year of 1870 have now elapsed, and the course of railroad traffic having been pretty well developed, it may be considered a source of congratulation to parties interested in railroad property that the earnings of all the leading Western lines have been so well sustained. It was apparent, after the large traffic of 1869, and the completion in that year of a great number of new roads, that it would indicate decided soundness and prosperity should there be no material decline in earnings during the year 1870 from those of 1869. The figures of last year, however, have thus far not only been equalled, but in many cases materially exceeded, as the following table will show. It may probably be concluded that expenses this year have been below, or certainly not above, those of 1869; and such being the case, the confidence in railroad stocks (assuming always that the management of the road is honest and judicious), would seem to be fully warranted by the condition and income of the several properties.

EARNINGS FROM JANUARY 1 TO SEPTEMBER 1.				
	1870.	1869.	Inc.	Dec.
Central Pacific.....	\$5,490,205	\$3,476,813	1,813,392	...
Chicago & Alton.....	3,026,326	2,064,957	961,369	...
Chicago & Northwestern.....	7,906,827	8,092,46	785,319	...
Chicago & Rock Island.....	3,097,555	1,708,68	70,913	...
Clev'd, Col., Ind. & Ill. ....	2,012,864	1,966,365	46,499	...
Illinois Central.....	5,521,15	5,416,305	104,842	...
Marquette & Cincinnati.....	246,941	87,532	259,409	...
Milwaukee & St. Paul.....	4,283,024	4,066,135	216,889	...
North Missouri.....	1,811,375	1,153,245	768,022	...
Ohio & Mississippi.....	1,947,466	1,741,775	20,690	...
Pacific of Missouri.....	3,85,800	1,934,510	251,280	...
Toledo, Wabash & W'n.....	2,661,373	2,61,587	59,786	...
Total.....	\$41,304,991	\$38,681,807	\$2,623,184	\$290,123

—Commercial and Financial Chronicle.

#### PUBLISHER'S ANNOUNCEMENTS.

##### The Railroad Gazette.

From Southwest Georgia the very heart of the richest cotton district east of the Mississippi, comes the following appreciative notice in the Albany News, to which we have long been indebted for much news concerning Georgia railroads. Under the head of "RAILROAD GAZETTE," it says: "This excellent weekly keeps its readers better posted as to what is going on in the railroad world than any other we have seen. No civil engineer, railroad president, superintendent, machinist, or other officer, or contractors should be without it. In fact whoever is at all interested in the construction or management of railroads should take a copy of it."

A late number of the Milwaukee Wisconsin says that the RAILROAD GAZETTE "is a very valuable publication so far as railroad matters are concerned, and all who desire to keep themselves posted on the subjects connected with railroads will take it."



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OFFICE OF THE OHIO & MICH. RY CO.,  
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Proposals will be received at this office until October 17, 1870, for the clearing, grubbing, grading, tying and bridging of that portion of the line of the Ohio & Michigan Railway extending from the State Line, in the township of Amboy, through the counties of Hillsdale, Branch, alhoun, Kalamazoo, and to the village of Allegan, in Allegan county, a distance of 95 miles.

Proposals may be made for one or more sections, or for the whole work.

Proposals will state the proportion of cash, and of Capital Stock of the Company, which will be received for the work.

Plans and specifications will be exhibited at this office on and after the 1st of October next.

The Company reserve the right to reject any or all bids, or to accept such only as may seem to the Directors to be for the best interest of the stockholders.

Sealed proposals to be addressed to JOHN S. YOUNGS, Secretary.

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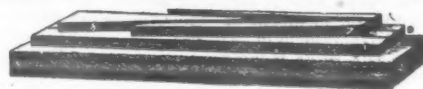
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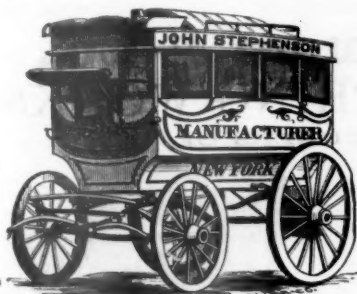
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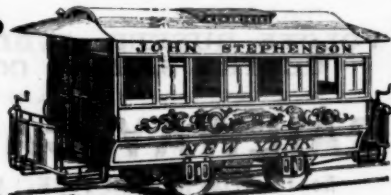
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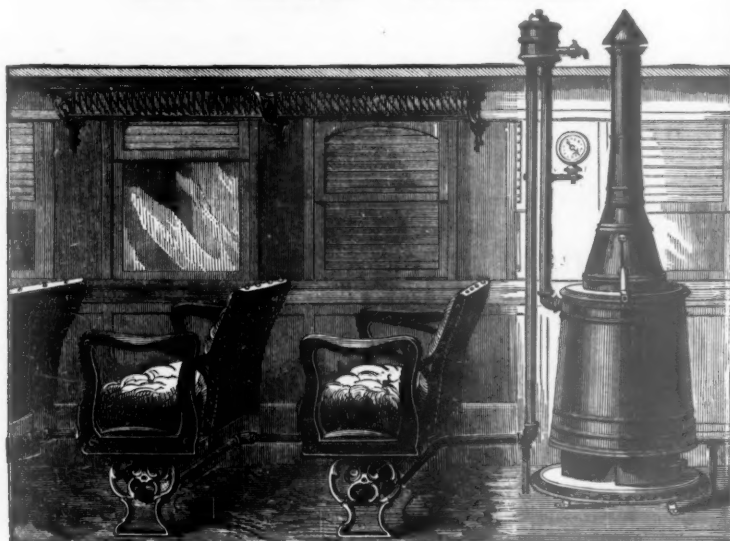
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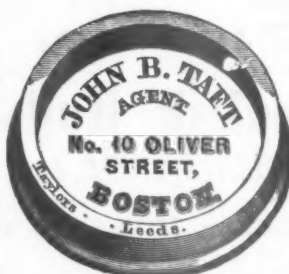
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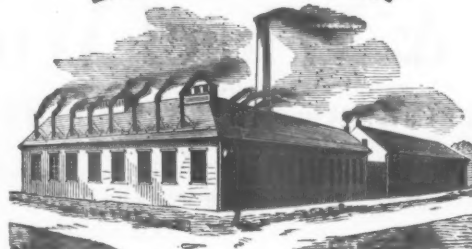
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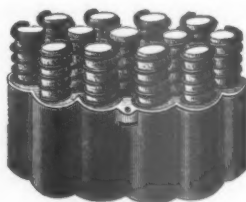
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MANUFACTURERS OF

**Superior Cast Steel Files.**  
LANCASTER, PA.

**Union Car Spring Mfg Co.**

Sole Proprietors of the



Wool-Packed Spiral.



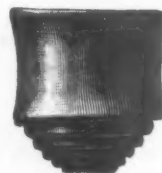
Hebbard.

**HEBBARD CAR SPRING!**

Offices: No. 4 Dey St., New York, and 19 Wells St., Chicago.

FACTORIES: JERSEY CITY, N. J., and SPRINGFIELD, MASS.

**Vose, Dinsmore & Co.,**  
NATIONAL SPRING WORKS,  
MANUFACTURERS OF



Volute Buffer Spring.



Group Rubber Center Spiral Spring.

**VOLUTE BUFFER, INDIA RUBBER, RUBBER  
CENTRE SPIRAL, COMPOUND SPIRAL,  
AND OTHER**

**RAILWAY CAR SPRINGS.**

No. 1 Barclay St., NEW YORK. | No. 15 La Salle St., CHICAGO.

WORKS ON 129th AND 130th STREETS NEW YORK.



## GENERAL FREIGHT DEPARTMENT.

## The Illinois Central Railroad

ARE PREPARED TO TAKE FREIGHT FOR

Cairo, St. Louis, Peoria,  
BLOOMINGTON, SPRINGFIELD, JACKSONVILLE,

And All Points in the Central and Southern parts of the State;

MOBILE &amp; NEW ORLEANS BY RAIL OR RIVER

And ALL POINTS on the MISSISSIPPI below CAIRO. Also, to

Freeport, Galena and Dubuque.

Freight Forwarded with Promptness and Despatch, and Rates at all times as LOW as by any other Route.

BY THE COMPLETION OF THE BRIDGE AT DUNLEITH,

THEY ARE ENABLED TO TAKE FREIGHT TO ALL POINTS WEST OF DUBUQUE

WITHOUT CHANGE OF CARS!

DELIVER FREIGHT IN CHICAGO ONLY at the FREIGHT DEPOT of the Company, foot of South Water St. Parties ordering Goods from the East should have the packages marked:

"Via Illinois Central Railroad."

For THROUGH BILLS OF LADING, and further information, apply to the LOCAL FREIGHT AGENT at Chicago, or to the undersigned.

M. HUGHITT, Gen. Supt.

J. F. TUCKER, Gen. Freight Agt.

## Geo. C. Clarke &amp; Co.,

FIRE, INLAND AND OCEAN MARINE

## INSURANCE AGENCY.

15 Chamber of Commerce, Chicago.

New England M. M. Insurance Co., of Boston,  
ASSETS \$1,197,000.Independent Insurance Company, - of Boston,  
ASSETS \$680,000.North American Fire Ins. Co., of New York,  
ASSETS \$800,000.Excelsior Fire Insurance Co., - of New York,  
ASSETS \$340,000.Fulton Fire Insurance Company, of New York,  
ASSETS \$400,000.Home Insurance Company, - of Columbus, O.  
ASSETS \$515,000.

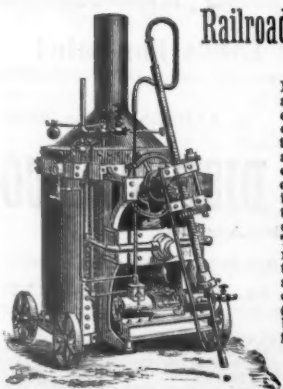
## LESCHOT'S PATENT

DIAMOND POINTED

## Steam Drills!

— FOR —

Railroad Grading, Well Boring, Prospecting, &amp;c.

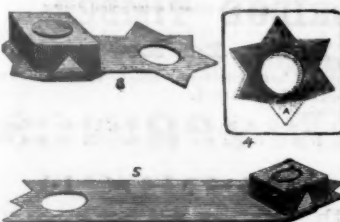


The unequalled efficiency and economy of these DRILLING MACHINES are fully established, and they are fast superseding all other inventions for **ROCK DRILLING**. They are constructed of various sizes and patterns to suit different classes of work, being adapted to Channelling and Girdling in quarries; to shafting, tunnelling, prospecting and all open cut work in mines; also to heavy Railroad grading and Sub-marine Blasting. They operate noiselessly without percussion; and produce a perfectly cylindrical hole of uniform diameter. Their usual rate of boring is three to five (3 to 5) inches per minute in hard rock; eight to ten (8 to 10) inches per minute in slate and sand rock, and eighteen to twenty-two (18 to 22) inches per minute in coal. TEST CORES, in the form of solid cylinders of rock or mineral may be taken out of mines from any depth—not exceeding one thousand (1,000) feet—showing the geological formation, character of mineral deposits, &c. These drills never need sharpening and no steel is consumed in boring—as the cutting point is composed of rough, uncut diamonds, are practically indestructible. Boilers, Engines, Steam Pumps, and all necessary tools furnished with drills. Illustrated circular sent on application.

SEVERANCE & HOLT, Manufacturers,  
Office, 16 Wall Street, New York

Office for the Western States at Eagle Works, 48 Canal St., Chicago. J. C. VINTON, Agent.

## THE UNION PATENT STOP WASHER,



Manufactured at Coatesville, Chester Co., Pa., on the line of the Pennsylvania Central R. R., has now stood the test of practical use on the above road, the Philadelphia, Wilmington & Baltimore and Philadelphia & Reading Railroads, for the past two years, and proved itself to be what is claimed for it—a perfect security against the unscrewing or receding of nuts. Its simplicity, efficiency and cheapness over any other appliance for the purpose should recommend it to the attention of all persons having charge of Railroad tracks, cars and machinery.

It is especially adapted to, and extensively used by leading Railroads of the country for the purpose of securing nuts on railway joints.

The accompanying cuts show the application of the Washer. For further information, apply to

A. GIBBONS, Coatesville, Pa.

## THE

## "RED LINE!"

—RUNNING OVER THE—

Michigan Southern and Lake Shore R. R.'s,

—WAS THE—

FIRST LINE to CARRY FREIGHT BETWEEN the EAST and WEST,  
WITHOUT CHANGE OF CARS!

CARS RUN THROUGH TO

NEW YORK AND BOSTON,

IN FOUR AND FIVE DAYS!

Contracts made at the Offices of the Line.

C. Shutter, Agent,  
347 Broadway, New York.A. Cushman, Agent,  
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W. D. MANCHESTER, Agent, 54 Clark St., Chicago.

Great Central Route.

## "BLUE LINE."

ORGANIZED JANUARY 1, 1867.



1870.

1870.

OWNED AND OPERATED BY THE

Michigan Central, Illinois Central, Chicago, Burlington &amp; Quincy, Chicago &amp; Alton, Great Western (of Canada), New York Central, Hudson River, Boston &amp; Albany, and Providence and Worcester Railroads.

The "BLUE LINE" is the only route that offers to shippers of freight the advantages of an unbroken gauge through from Chicago to the Seaboard, and to all Interior Points on the line of Eastern Connections beyond Suspension Bridge and Buffalo. All Through Freight is then transported between the most distant points of the roads in interest.

## WITHOUT CHANGE OF CARS!

The immense freight equipment of all the roads in interest is employed, as occasion requires, for the through service of this Line, and has of late been largely increased. This Line is now prepared to extend facilities for the transit and delivery of all kinds of freight in Quicker Time and in Better Order than ever before.

## The Blue Line Cars

are all of a solid, uniform build, thus largely lessening the chances of delay from the use of cars of a mixed construction, and the consequent difficulty of repairs, while remote from their own roads. The Blue Line is operated by the railroad companies who own it, without the intervention of intermediate parties between the Roads or Line and the public.

Trains run through with regularity **IN FOUR OR FIVE DAYS** to and from New York and Boston. Especial care given to the Safe and Quick Transport of Property Liable to Breakage or Injury, and to all **Perishable Freight**.

Claims for overcharges, loss or damage, promptly settled upon their merits. Be particular and direct all shipments to be marked and consigned via

## "BLUE LINE."

**FREIGHT CONTRACTS** given at the offices of the company in Chicago, New York and Boston.

J. D. HAYES, GEN. MANAGER, Detroit

C. E. NOBLE, 349 Broadway, N. Y.

P. K. RANDALL, 69 Washington St., Boston

GEO. E. JARVIS, Quincy, Ill.

W. W. STREET, 91 Lake St., Chicago

N. D. MUNSON, Quincy, Ill.

J. JOHNSON, Cairo, Ill.

THOS. HOOPS, GEN. FR'T AGT. Michigan Central Railroad, Chicago.  
A. WALLINGFORD, AGT. M. C. & G. W. R. R., No. 91 Lake St., Chicago.  
N. A. SKINNER, Freight Agent Michigan Central Railroad.

## Empire Line.

THE EMPIRE TRANSPORTATION COMPANY'S

## Fast Freight Line to the East

—AND—

TO THE COAL AND OIL REGIONS,

Via Michigan Southern, Lake Shore, and Philadelphia &amp; Erie R. R.'s,

WITHOUT TRANSFER!

Office, No. 72 LaSalle Street, Chicago.

GEO. W. RISTINE, Western Superintendent, Cleveland, Ohio.

W. G. Van Demark, 363 Broadway, New York. E. L. O'Donnell, Baltimore, Md.

G. B. McCulloch, 43 South 4th St., Philadelphia. Wm. F. Smith, Erie, Penn.

JOHN WHITTAKER, Pier 14 North River, New York.

JOSEPH STOCKTON, Agent, Chicago.

W. T. HANCOCK, Contracting Agent.

WM. F. GRIFFITHS, Jr., Gen. Freight Agent, Philadelphia.



## CHICAGO, ROCK ISLAND & PACIFIC RAILROAD.

THE DIRECT ROUTE FOR  
JOLIET, MORRIS, OTTAWA, LASALLE, PERU, HENRY, PEORIA,  
Lacon, Geneseo, Moline,  
ROCK ISLAND, DAVENPORT,  
Muscatine, Washington, Iowa City,  
GRINNELL, NEWTON, DES MOINES,

## COUNCIL BLUFFS & OMAHA!

CONNECTING WITH TRAINS ON THE UNION PACIFIC RAILROAD, FOR  
Cheyenne, Denver, Central City, Ogden, Salt Lake,  
White Pine, Helena, Sacramento, San Francisco,  
And Points in Upper and Lower California; and with Ocean Steamers at San Francisco, for all Points in  
China, Japan, Sandwich Islands, Oregon and Alaska.

TRAINS LEAVE their Splendid new Depot, on VanBuren Street, Chicago, as follows:

	LEAVE	ARRIVE
PACIFIC EXPRESS, (Sunday excepted).....	10.00 a. m.	3.35 p. m.
PERU ACCOMMODATION, (Sundays excepted).....	5.00 p. m.	9.50 a. m.
PACIFIC EXPRESS, (Saturdays excepted,).....	10.00 p. m. (Mon. ex. 6.00 a. m.)	

## ELEGANT PALACE SLEEPING COACHES!

Run Through to Peoria and Council Bluffs, Without Change.

Connections at LA SALLE, with Illinois Central Railroad, North and South; at PEORIA, with  
Peoria, Pekin & Jacksonville Railroad, for Pekin, Virginia, &c.; at PORT BYRON JUNCTION, for  
Hampton, LeClaire, and Port Byron; at ROCK ISLAND, with Packets North and South on the Miss  
issippi River.  
For Through Tickets, and all desired information in regard to Rates, Routes, etc., call  
at the Company's Office, No. 37 South Clark Street, Chicago, 413 California Street, San Francisco, or  
257 Broadway, New York.

A. M. SMITH, Gen. Pass. Agent. HUGH RIDDLE, Gen. Supt. P. A. HALL, Asst. Gen. Supt.

## Leavenworth, Lawrence,

## GALVESTON R. R. LINE, OF KANSAS.

Two Distinct Lines of Road from Kansas City, Mo., and Lawrence, Kan.,  
Uniting at OTTAWA, and from thence as a Trunk Line to

## INDIAN TERRITORY.

The SHORTEST and ONLY DIRECT ROUTE to the celebrated Neosho  
and Verdigris Valleys of Kansas, and will be opened for business  
to the Border of Indian Territory, by Nov. 1st, 1870.

FIVE DAILY TRAINS, Each Way, connecting at LAWRENCE with trains the  
KANSAS PACIFIC ROAD, for WEST and NORTH and at KANSAS CITY with ALL ROADS FOR  
THE EAST and NORTH, at end of Track with KANSAS STAGE CO.'S LINE OF COACHES for all parts of

## INDIAN TERRITORY, TEXAS & NEW MEXICO.

Ask for Tickets via L. L. & G. R. R., for all points in Southern Kansas.  
Freight taken from any part of the East to end of track WITHOUT BREAKING BULK.

CHAS. B. PECK, M. R. BALDWIN,  
Gen. Freight and Ticket Agent, Lawrence, Kan. Superintendent, Lawrence, Kan.

The Great Favorite Route for Missouri, Nebraska and Iowa.

## KANSAS CITY, ST. JOSEPH

## COUNCIL BLUFFS

THROUGH LINE!

8 EXPRESS PASSENGER TRAINS Leave Union Depot Daily, on the arrival of Eastern  
Southern and Western Trains, crossing the Missouri River on the New Iron Bridge at KANSAS  
City, passing the cities of

## LEAVENWORTH, ATCHISON, SAINT JOSEPH,

## NEBRASKA CITY.

Connecting at COUNCIL BLUFFS with Iowa Lines for all prominent points in Iowa, and making  
DIRECT CONNECTION at OMAHA with the Great Union Pacific Railroad, for

CHEYENNE, DENVER, SALT LAKE, SACRAMENTO, SAN FRANCISCO,  
And the Pacific Coast.

## Pullman's Palace Sleeping Cars!

ON ALL NIGHT TRAINS.

Ask for Tickets via the People's Favorite Route, Kansas City, St. Joseph & Coun-  
cil Bluffs Railroad Line.

A. L. HOPKINS, A. C. DAWES,  
Gen. Superintendent, ST. JOSEPH, Mo. Gen. Passenger Agent, ST. JOSEPH, Mo.

## Milwaukee & St. Paul R. W.

THE ONLY ALL RAIL LINE TO

## ST. PAUL AND MINNEAPOLIS!

AND ALL PORTIONS OF

Wisconsin, Minnesota & Northern Iowa.

PURCHASE TICKETS VIA MILWAUKEE.

Passengers Going via Milwaukee,

Have Choice of Seats in Clean Coaches, and on Night  
Trains, a full night's rest in Palace Sleeping Cars.

BAGGAGE CHECKED THROUGH BY THIS ROUTE ONLY!

PASSENGERS FROM CHICAGO can obtain these Advantages only by  
the MILWAUKEE DIVISION OF THE CHICAGO & NORTHWESTERN R.Y.

SPECIAL NOTICE.—Passengers destined to any place  
in Wisconsin, Minnesota, or Northern Iowa, either on or off the  
Lines of this Company, who cannot procure Through Tickets to  
their destination, should purchase their Tickets TO MILWAU-  
KEE, as this is the Great Distributing Point for these States.

A. V. H. CARPENTER,  
Gen. Pass. Agt. Milwaukee.

S. S. MERRILL,  
Gen. Manager, Milwaukee.

## KANSAS PACIFIC RAILWAY.

Great Smoky Hill Route,

Now Completed and Open for Business Through to

## DENVER, COLORADO,

There Connecting with the DENVER PACIFIC RAILROAD for CHEYENNE, forming,  
in Connection with the UNION and CENTRAL PACIFIC RAILROADS,  
another ALL-RAIL ROUTE to

## CALIFORNIA, NEVADA, UTAH, MONTANA, WYOMING, COLORADO, &c.

The most available Passenger and Freight Route to Lawrence, Topeka, Junction City, Abilene, Salina,  
Hays, KIT CARSON, River Bend, DENVER, CHEYENNE, OGDEN, SALT LAKE CITY,  
Sacramento, and San Francisco.

Close Connections are made in Union Depots at KANSAS CITY and STATE LINE with Ex-  
press Trains of the HANBIRAL & ST. JOSEPH, NORTH MISSOURI and MISSOURI PACIFIC RAILROADS.  
Southern Overland Passenger and Mail Coaches leave Kit Carson daily for Pueblo, Trinidad, Fort  
Union, Santa Fe, &c.

Hughes & Co.'s Splendid Concord Coaches leave Denver daily for Central City, Georgetown, &c.  
Passenger and Freight Rates always as low and conveniences as ample as by any other Route.

## PULLMAN'S PALACE CARS ACCOMPANY NIGHT EXPRESS TRAINS.

Through Tickets can be obtained at all principal ticket offices. Be careful to ask for tickets  
via Kansas Pacific Railway, "Smoky Hill Route."

5,000,000 Acres of Farming Lands For Sale!

Situated along the line of this Great National Railway. For particulars, address JNO. P. DEVEREUX,  
Land Commissioner, Lawrence, Kansas.

R. B. GEMMELL, Gen. Freight & Ticket Agt. A. ANDERSON, Gen. Supt.

## THE ERIE & PACIFIC DISPATCH CO.

Are Authorized Freight Agents.

For information, Contracts, and Bills of Lading, apply at their office, 64 Clark Street, Chicago.

H. H. RAPP, AGT.



Dealers in

## R. R. Cross-Ties, Telegraph Poles,

FENCE POSTS, BRIDGE TIMBER,

Piles, Hard-wood Plank, &c., &c.,

To which the Attention of Railroad Contractors and Purchasing  
Agents is respectfully called.

REFER TO:—Jas. M. Walker, Chicago, Pres't L. L. & G. R. R.; Jas. E. & Wm. Young, Chicago,  
Railroad Builders; H. J. Higgins, Purchasing Agent C. B. & Q. R. R.; and Railroad Officers and Pur-  
chasing Agents generally.

MARSH & GOODRIDGE,  
256 South Water St., Chicago.



# CHICAGO & NORTHWESTERN R. W.

Comprising the PRINCIPAL RAILROADS from CHICAGO Directly NORTH NORTH-WEST and WEST.

ALL RAIL TO THE PACIFIC OCEAN!

## Great California Line.

TRAINS LEAVE WELLS STREET DEPOT AS FOLLOWS:

8:15 A. M. Cedar Rapids Pass 9:15 P. M. Night Mail.  
10:30 A. M. Pacific Express. 9:15 P. M. Rock Island Pass.  
10:30 A. M. Rock Island Exp. 4:00 P. M. Dixon Passenger.  
For Sterling, Rock Island, Fulton, Clinton, Cedar Rapids, Boone, Denison, Missouri Valley Junction, Sioux City, Council Bluffs and Omaha, there connecting with the

## UNION PACIFIC R. R.

For Cheyenne, Denver, Ogden, Salt Lake, the White Pine Silver Mines, Sacramento, San Francisco, and all parts of Nebraska, Colorado, New Mexico, Arizona, Wyoming, Montana, Idaho, Utah, Nevada, and the PACIFIC COAST.

FROM CHICAGO	Hours	1st Class Fare	FROM CHICAGO	Days	1st Class Fare
To OMAHA.....	23	\$20.00	To SACRAMENTO..	4 1/2	\$118.00
" DENVER.....	52	70.75	" SAN FRANCISCO, 5		118.00

TRAINS ARRIVE:—Night Mail, 7:00 a. m.; Dixon Passenger, 11:00 a. m.; Pacific Express, 3:50 p. m.; Rock Island Express, 3:50 p. m.; Cedar Rapids Passenger, 6:50 p. m.

## FREEPORT LINE.

9:00 A. M. & 9:45 P. M. For Belvidere, Rockford, Freeport, Galena, Dunleith, and St. Paul.  
4:00 P. M., Rockford Accommodation.  
5:30 P. M., Geneva and Elgin Accommodation.  
6:10 P. M., Lombard Accommodation.  
5:50 P. M., Junction Passenger.

TRAINS ARRIVE:—Freeport Passenger, 2:30 a. m., 3:00 p. m.; Rockford Accommodation, 11:10 a. m.; Geneva and Elgin Accommodation, 8:45 a. m.; Junction Passenger, 8:10 a. m.; Lombard Accommodation, 6:50 a. m.

## WISCONSIN DIVISION.

Trains leave Depot, cor. West Water and Kinzie Sts., daily, Sundays excepted, as follows:  
10:00 A. M. DAY EXPRESS, for Janesville, Monroe, Whitewater, Madison, Prairie du Chien, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Neenah, Appleton, and Green Bay.

3:00 P. M. Janesville Accommodation.  
5:00 P. M. NIGHT EXPRESS, for Madison, Prairie du Chien, Watertown, Minnesota Junction, Portage City, Sparta, La Crosse, St. Paul, and ALL POINTS ON THE UPPER MISSISSIPPI RIVER; Ripon, Berlin, Fond du Lac, Oshkosh, Menasha, Appleton, Green Bay, and THE LAKE SUPERIOR COUNTRY.

5:30 P. M., Woodstock Accommodation.  
6:20 P. M., Barrington Passenger.  
TRAINS ARRIVE:—5:30 a. m., 7:45 a. m., 1:10 a. m., 1:00 p. m. and 7:15 p. m.

## MILWAUKEE DIVISION.

MILWAUKEE MAIL..... 8:00 A. M.  
EXPRESS, (ex. Sun.) Waukegan, Kenosha, Racine and Milwaukee..... 9:45 A. M. 5:00 P. M.  
EVANSTON PASSENGER..... 11:40 A. M.  
HIGHLAND PARK PASSENGER..... 1:15 P. M.  
MILWAUKEE ACCOMMODATION, with Sleeping Car attached..... 11:00 P. M.  
EVANSTON ACCOMMODATION, (Daily, from Wisconsin Div. Depot.)..... 1:30 P. M.  
KENOSHA ACCOMMODATION, (Sundays excepted) from Wells St. Depot..... 4:15 P. M.  
AFTERNOON PASSENGER, from Milwaukee Div. Depot..... 5:00 P. M.  
WAUKEGAN ACCOMMODATION, (except Sundays) from Wells St. Depot..... 5:25 P. M.  
WAUKEGAN PASSENGER, (Sundays excepted) from Wells St. Depot..... 6:15 P. M.  
TRAINS ARRIVE:—Night Accommodation, with Sleeping Car, 5:00 a. m.; Day Express, 4:10 p. m.; Milwaukee Mail, 10:10 a. m.; Afternoon Passenger, 8:00 p. m.; Waukegan Accommodation, 8:25 a. m.; Kenosha Accommodation, 9:10 a. m.; Evanston Accommodations, 1:40 and 4:00 p. m.; Waukegan Passenger, 7:55 a. m.; Highland Park Passenger, 3:45 p. m.

## PULLMAN PALACE CARS ON ALL NIGHT TRAINS.

THROUGH TICKETS Can be purchased at all principal Railroad Offices East and South, and in Chicago at the Southeast corner of Lake and Clark Streets, and at the Passenger Stations as above.

H. P. STANWOOD,  
Gen. Ticket Agt.

GEO. L. DUNLAP,  
Gen'l Supt.

## Western Union Railroad.

CHICAGO & NORTHWESTERN DEPOT, CHICAGO. | MILWAUKEE & CHICAGO DEPOT, MILWAUKEE.

## THE DIRECT ROUTE!

CHICAGO, RACINE & MILWAUKEE,

—TO—

Beloit, Savanna, Clinton, Pt. Byron, Davenport, Mineral Point, Madison, Freeport, Fulton, Lyons, Rock Island, Sabula, Galena, Dubuque, Des Moines, Council Bluffs,

## OMAHA, SAN FRANCISCO

AND ALL PRINCIPAL POINTS IN

Southern and Central Wisconsin, Northern Illinois, and Central and Northern Iowa.

FRED. WILD,  
Gen. Ticket Agent.

D. A. OLIN,  
Gen. Superintendent.



## CRERAR, ADAMS & CO.,

MANUFACTURERS AND DEALERS IN

## Railroad Supplies!

—AND—

## CONTRACTORS' MATERIAL.

11 and 13 Wells Street,

CHICAGO, ILL.

Manufacturers of IMPROVED HEAD-LIGHTS for Locomotives, Hand and Signal Lanterns, Car and Station Lamps, Brass Dome Castings, Dome Mouldings, Cylinder Heads, and Car Trimmings, of Every Description

## Pan-Handle

—AND—

## Penn'a Central Route East!

SHORTEST AND QUICKEST ROUTE, VIA COLUMBUS, TO PITTSBURGH, BALTIMORE, PHILADELPHIA & NEW YORK

On and after Saturday, JULY 10th, 1870, Trains for the East will run as follows:

[DEPOT CORNER CANAL AND KINZIE STS., WEST SIDE.]

## 8:10 A. M. DAY EXPRESS.

[SUNDAYS EXCEPTED.] Via Richmond. Arriving at

COLUMBUS... 2:35 A. M. | HARRISBURG... 10:35 P. M. | NEW YORK... 6:40 A. M. | WASHINGTON... 5:50 A. M. | PITTSBURGH... 12:00 M. | PHILADELPHIA... 3:10 A. M. | BALTIMORE... 2:30 A. M. | BOSTON... 5:05 P. M.

## 7:40 P. M. NIGHT EXPRESS.

[SATURDAYS EXCEPTED.] Arriving at:

COLUMBUS... 11:15 A. M. | HARRISBURG... 5:10 A. M. | NEW YORK... 12:10 P. M. | WASHINGTON... 1:10 P. M. | PITTSBURGH... 7:05 P. M. | PHILADELPHIA... 9:35 A. M. | BALTIMORE... 9:00 A. M. | BOSTON... 11:50 P. M.

## Palace Day and Sleeping Cars

Run Through to COLUMBUS, and from Columbus to NEW YORK, WITHOUT CHANGE!

## ONLY ONE CHANGE TO NEW YORK, PHILADELPHIA, OR BALTIMORE!

## CINCINNATI & LOUISVILLE AIR LINE SOUTH.

42 Miles the Shortest Route to Cincinnati,  
18 Miles the Shortest Route to Indianapolis and Louisville.

—FROM ONE TO—

## 2 Hours the Quickest Route to Cincinnati!

THE SHORTEST AND BEST ROUTE TO

Columbus, Chillicothe, Hamilton, Wheeling, Parkersburg, Evansville, Dayton, Zanesville, Marietta, Lexington, Terre Haute, Nashville,

ALL POINTS IN CENTRAL & SOUTHERN OHIO, & INDIANA, KENTUCKY & VIRGINIA.

—QUICK, DIRECT AND ONLY ALL RAIL ROUTE TO—

## New Orleans, Memphis, Mobile, Vicksburg, Charleston, Savannah,

AND ALL POINTS SOUTH.

Cincinnati, Indianapolis and Louisville Trains run as follows:

THROUGH WITHOUT CHANGE OF CARS!

## 8:10 A. M. 7:40 P. M.

(Sundays excepted) Arriving at

LOGANSPORT..... 1:15 P. M.	LOGANSPORT..... 1:30 A. M.
KOKOMO..... 2:35 P. M.	KOKOMO..... 2:45 A. M.
CINCINNATI..... 9:30 P. M.	CINCINNATI..... 10:30 A. M.
INDIANAPOLIS..... 5:00 P. M.	INDIANAPOLIS..... 5:40 A. M.
LOUISVILLE..... 11:30 P. M.	LOUISVILLE..... 8:50 P. M.

Lansing Accommodation: Leaves 5:10 P. M. Arrives 8:55 A. M.

Dolton Accommodation: Leaves 10:10 A. M. Arrives 3:25 P. M.

## PULLMAN'S PALACE SLEEPING CARS!

Accompany all Night Trains between Chicago and Cincinnati or Indianapolis.

Ask for Tickets via COLUMBUS for the East, and via "THE AIR LINE" for Cincinnati, Indianapolis, Louisville and points South. Tickets for sale and Sleeping Car Berths secured at 95 RANDOLPH STREET, CHICAGO, and at Principal Ticket Offices in the West and Northwest.

WM. L. O'BRIEN,  
Gen. Pass. and Ticket Agent, Columbus.

I. S. HODSDON,  
Northwestern Pass. Agt., Chicago.

D. W. CALDWELL Gen. Supt. Columbus.

## MOORE

## Steel Elastic Car Wheel Co.

OF NEW JERSEY.

Proprietors of

MOORE'S PATENT

FOR THE MANUFACTURE OF

## ELASTIC CAR WHEELS.

FOR PASSENGER AND SLEEPING COACHES.

Noiseless, Safe, Durable and Economical.

Also, Manufacturers of

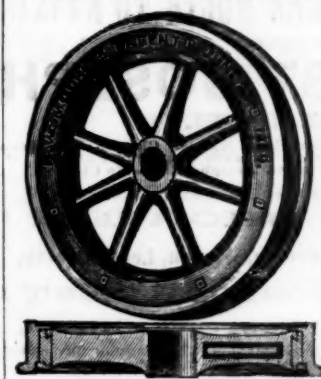
## CAR WHEELS OF EVERY DESCRIPTION.

H. W. MOORE, President.

JAS. K. FROTHINGHAM, Secretary.

F. W. BLOODGOOD, Treasurer.

Works, cor. Green and Wayne Sts., JEFFERSON CITY, N. J.  
P. O. Address—Box 129, Jersey City, N. J.



## American Compound Telegraph Wire.

More than 3000 Miles now in Operation,

Demonstrating beyond question its superior working capacity, and great ability to withstand the elements. For RAILROAD LINES connecting a single wire with a large number of Stations, and for long circuits, this wire is peculiarly adapted; the large conducting capacity secured by the copper, with other advantages, rendering such lines fully serviceable during the heaviest rains.

Having a core of steel, a small number of poles only are required, as compared with iron wire construction, thereby preventing much loss of the current from sags; and very materially reducing cost of maintenance. OFFICE AMERICAN COMPOUND TELEGRAPH WIRE CO.

BLISS, TILLOTSON & CO., Western Agents,  
247 South Water Street, Chicago.



THE FAVORITE THROUGH PASSENGER ROUTE!

## Chicago, Burlington & Quincy RAILROAD LINE.

3 THROUGH EXPRESS TRAINS DAILY!

FROM CHICAGO	Hours.	1st Class Fare.	FROM CHICAGO	Days.	1st Class Fare.
TO OMAHA, - - -	23	\$20.00	TO DENVER, - - -	2½	\$68.70
" ST. JOSEPH, - -	21	19.50	" SACRAMENTO, - -	4½	118.00
" KANSAS CITY, -	22	20.00	" SAN FRANCISCO, -	5	118.00

TRAINS LEAVE CHICAGO from the Great Central Depot, foot of Lake Street, as follows:

BURLINGTON, KEOKUK, COUNCIL BLUFFS &amp; OMAHA LINE.

7:40 A. M. MAIL AND EXPRESS. (Except Sunday,) stopping at all stations; making close connections at Mendota with Illinois Central for Amboy, Dixon, Freeport, Galena, Dunleith, Dubuque, LaSalle, El Paso, Bloomington, &amp;c.

10:45 A. M. PACIFIC FAST LINE. (Except Sunday,) stopping at Buda, Keosauqua, Galva, Galesburg, and all Stations West and South of Galesburg.

An ELEGANT DAY COACH and a PULLMAN PALACE DRAWING ROOM CAR is attached to this train daily from Chicago.

TO COUNCIL BLUFFS &amp; OMAHA WITHOUT CHANGE!

5:00 P. M. EVENING EXPRESS. (Daily, except Sunday,) in direct connection with the celebrated New York and Chicago Lightning Express Trains of all Eastern Lines, for Burlington, Ottumwa, Des Moines, Nebraska City, Council Bluffs, Omaha, and all points West. Pullman Drawing-Room Sleeping Car attached to this train daily from Chicago to Ottumwa without change!

11:30 P. M. NIGHT EXPRESS. (Daily, except Saturday,) stopping at all principal stations between Chicago and Burlington. ELEGANT DAY COACHES, and a PULLMAN PALACE DRAWING ROOM CAR are attached to this train from Chicago to Burlington, without change! This is the only Route between

CHICAGO, COUNCIL BLUFFS &amp; OMAHA,

— RUNNING THE CELEBRATED —

Pullman Palace Dining Cars!

49 MILES THE SHORTEST ROUTE BETWEEN

Chicago &amp; Keokuk,

And the Only Route Without Ferrying the Mississippi River!

QUINCY, ST. JOSEPH, LEAVENWORTH &amp; KANSAS CITY LINE.

10:45 A. M. PACIFIC EXPRESS. (Daily, except Sunday,) with an elegant Day Coach and one of PULLMAN'S PALACE SLEEPING CARS attached, running through from Chicago to KANSAS CITY, without change!

5:00 P. M. EVENING EXPRESS. (Daily, except Sunday,) with Pullman Palace Drawing-Room Sleeping Car attached, running through from Chicago to QUINCY, without change!

11:30 P. M. NIGHT EXPRESS. (Daily, except Saturday,) with Pullman Palace Drawing-Room Sleeping Car attached from Chicago to GALESBURG; PALACE DAY COACHES from Chicago to QUINCY, without change!

64 MILES THE SHORTEST AND ONLY ROUTE BETWEEN

Chicago and Kansas City!

WITHOUT CHANGE OF CARS OR FERRY.

115 MILES The Shortest Route bet. Chicago &amp; St. Joseph.

THE SHORTEST, BEST AND QUICKEST ROUTE BETWEEN CHICAGO AND

Atchison, Weston, Leavenworth, Lawrence,

AND ALL POINTS ON THE KANSAS PACIFIC R.R.

Local Trains Leave: RIVERSIDE &amp; HINSDALE ACCOMMODATION, 7:00 A. M.; 1:30 &amp; 6:15 P. M. MENDOTA PASSENGER. 4:15 P. M. AURORA PASSENGER. 5:30 P. M.

Trains Arrive:—Mail and Express, 3:45 p. m.; Atlantic Exp., 4:15 p. m., except Sunday; Night Exp., 9:05 a. m., except Monday; Mendota Passenger, 10:00 a. m.; Aurora Passenger, 8:15 a. m.; Quincy Passenger, 7:30 P. M.; Riverside and Hinsdale Accommodation, 6:50 and 9 a. m. and 5:30 p. m., except Sunday.

Ask for Ticket via Chicago, Burlington &amp; Quincy Railroad, which can be obtained at all principal offices of connecting roads, and at Company's office in Great Central Depot, Chicago, at as low rates as by any other route.

ROBT HARRIS, Gen'l Superintendent, CHICAGO. SAM'L POWELL, Gen'l Ticket Agent, CHICAGO. E. A. PARKER, Gen. West. Pass. Agt., CHICAGO.

THE GREAT THROUGH PASSENGER ROUTE TO KANSAS

IS VIA THE OLD RELIABLE

## HANNIBAL & ST. JOSEPH SHORT LINE.

Crossing the Mississippi at Quincy and the Missouri at Kansas City on New Iron Bridges; running Three Daily Express Trains, Through Cars and Pullman Sleeping Palaces from Chicago &amp; Quincy to St. Joseph &amp; Kansas City.

The Advantages gained by this Line over any other Route from Chicago, are:

115 MILES THE SHORTEST!

To St. Joseph, Atchison, Hiawatha, Waterville, Weston, Leavenworth,

64 MILES THE SHORTEST!

To Kansas City, Fort Scott, Lawrence, Ottawa,

Garrett, Iowa, Humboldt, Topeka, Burlingame, Emporia, Manhattan, Fort Riley, Junction City, Salina, Ellsworth, Hays, Sheridan, Olathe, Paola, Cherokee Neutral Lands, Baxter Springs, Santa Fe, New Mexico, and all Points on the KANSAS PACIFIC and MISSOURI RIVER, FT. SCOTT &amp; GULF R.R.'s, with which we connect at Kansas City Union Depot.

THIS BEING THE SHORTEST LINE AND QUICKEST, is consequently the cheapest; and no one that is posted thinks of taking any other Route from Chicago to reach principal points in

Missouri, Kansas, Indian Territory, or New Mexico.

DAILY OVERLAND STAGES from west end Kansas Pacific Railway, for Pueblo, Santa Fe, Denver, and points in Colorado and New Mexico.

This is also a most desirable Route, via St. Joseph, to Brownsville, Nebraska City, Council Bluffs, and Omaha, connecting with the Union Pacific Railroad for Cheyenne, Denver, Salt Lake, Sacramento, San Francisco, and the Pacific coast.

Through Tickets for Sale at all Ticket Offices. Baggage Checked Through, and Omnibus Transfers and Portage avoided.

P. B. Groat, Gen. Ticket Agent,  
HANNIBAL, Mo.GEO. H. NETTLETON, Gen. Supt.,  
HANNIBAL, Mo.

Old, Reliable, Air-Line Route!

## CHICAGO, ALTON & ST. LOUIS R. R.

SHORTEST, QUICKEST AND ONLY DIRECT ROAD TO

Bloomington, Springfield, Jacksonville, Alton,

— AND —

## ST. LOUIS!

WITHOUT CHANGE OF CARS.

THE ONLY ROAD MAKING IMMEDIATE CONNECTIONS AT ST. LOUIS,  
WITH MORNING AND EVENING TRAINS

— FOR —

## ATCHISON, LEAVENWORTH, KANSAS CITY,

Lawrence, Topeka, Memphis, New Orleans,

And All Points South and Southwest.

TRAINS leave CHICAGO from the West-side Union Depot, near Madison Street Bridge.

EXPRESS MAIL, [Except Sundays].....	8:10 A. M.
LIGHTNING EXPRESS, [Except Saturdays and Sundays].....	9:50 P. M.
NIGHT EXPRESS, [Daily].....	6:00 P. M.
JOLIT ACCOMMODATION, [Except Sundays].....	4:40 P. M.
JACKSONVILLE EXPRESS, [Daily].....	6:00 P. M.

Trains arrive at Chicago at 8:00 P. M., 8:30 A. M. and 6:00 A. M. Joliet Accom., 9:40 A. M.

This is the ONLY LINE Between CHICAGO &amp; ST. LOUIS RUNNING

Pullman's Palace Sleeping and Celebrated Dining Cars!

BAGGAGE CHECKED THROUGH.

Through Tickets can be had at the Company's office, No. 55 Dearborn street, Chicago, or at the Depot, corner of West Madison and Canal streets, and at all principal Ticket Offices in the United States and Canada. Rates of Fare and Freights as low as by any other Route.

A. NEWMAN, Gen. Pass. Agent.

J. C. McMULLIN, Gen. Supt.

## North Missouri R. R.

PASSENGERS FOR

## KANSAS AND THE WEST,

ARE REMINDED THAT

THE NORTH MISSOURI R. R.

— IS —

11 MILES SHORTER than any other Route!

BETWEEN

St. Louis and Kansas City.

15 Miles Shorter between ST. LOUIS and LEAVENWORTH

— AND —

49 MILES SHORTER TO ST. JOSEPH!  
THAN ANY OTHER LINE OUT OF ST. LOUIS.

Three Through Express Trains Daily!

Pullman's Celebrated Palace Sleeping Cars on all Night Trains!

FOR TICKETS, apply at all Railroad Ticket Offices, and see that you get your Tickets via St. Louis and North Missouri Railroad.

C. N. PRATT, Gen. Eastern Agt.,  
111 Dearborn-st. CHICAGO.S. H. KNIGHT, Gen. Superintendent,  
ST. LOUIS.

JAS. CHARLTON, Gen. Pass. and Ticket Agt., St. Louis.

## Pacific Railroad of Missouri.

THE MOST DIRECT AND RELIABLE ROUTE FROM ST. LOUIS THROUGH TO

## KANSAS CITY, LEAVENWORTH & ATCHISON,

WITHOUT CHANGE OF CARS!

Close Connections at KANSAS CITY with Missouri Valley, Missouri River, Ft. Scott &amp; Gulf, and Kansas Pacific R'ys, for Weston, St. Joseph, Junction City, Fort Scott, Lawrence, Topeka, Sheridan, Denver, Fort Union, Santa Fe, and

## ALL POINTS WEST!

At SEDALIA, WARRENSBURG and PLEASANT HILL, with Stage Lines for Warsaw, Quincy, Bolivar, Springfield, Clinton, Osceola, Lamar, Carthage, Granby, Neosho, Baxter Springs, Fort Gibson, Fort Smith, Van Buren, Fayetteville, Bentonville.

PALACE SLEEPING CARS on all NIGHT TRAINS.

Baggage Checked Through Free!

THROUGH TICKETS for sale at all the Principal Railroad Offices in the United States and Canada. Be Sure and Get your Tickets over the PACIFIC R. R. OF MISSOURI.

W. B. HALE,  
Gen. Pass. and Ticket Agt.THOS. McKISOCK,  
General Superintendent



THREE HOURS IN ADVANCE OF ALL OTHER ROUTES!

Sixty-One Miles the Shortest Line! Only 27 Hours!

— FROM —

CHICAGO TO NEW YORK.

Pittsburgh, Ft. Wayne &amp; Chicago and Pennsylvania Central

IS THE ONLY ROUTE RUNNING ITS ENTIRE TRAIN THROUGH TO PHILADELPHIA AND NEW YORK, AND THE ONLY ROUTE RUNNING

THREE DAILY LINES OF PULLMAN'S DAY AND SLEEPING PALACES,

— FROM CHICAGO TO —

PITTSBURGH, HARRISBURG, PHILADELPHIA &amp; NEW YORK,

WITHOUT CHANGE!

WITH BUT ONE CHANGE TO

BALTIMORE, PROVIDENCE, NEW HAVEN,  
HARTFORD, SPRINGFIELD, WORCESTER AND BOSTON!

And the Most Direct Route to Washington City.

Trains Leave WEST SIDE UNION DEPOT, corner West Madison and Canal Streets, as follows:

LEAVE:	Mail	Fast Express	Pacific Exp.	Night Exp.	VALENTINE
CHICAGO	5.50 A. M.	11.00 A. M.	5.15 P. M.	9.00 P. M.	9.00 P. M.
PLYMOUTH	9.50 "	1.50 P. M.	9.10 "	2.15 A. M.	2.15 A. M.
FORT WAYNE	12.40 P. M.	3.30 "	11.30 "	5.30 A. M.	5.30 A. M.
LIMA	3.15 "	"	1.35 A. M.	8.10 "	8.10 "
FOREST	4.37 "	"	2.48 "	9.40 "	9.40 "
CRESTLINE	6.00 A. M.	5.55 "	4.30 "	12.05 P. M.	12.05 P. M.
MANSFIELD	6.42 "	7.16 "	5.00 "	12.34 "	12.34 "
ORRVILLE	9.05 "	8.42 "	6.45 "	2.37 "	2.37 "
ALLIANCE	10.45 "	9.55 "	8.40 "	3.55 "	3.55 "
ROCHESTER	12.05 P. M.	12.17 A. M.	10.52 "	6.02 "	6.02 "
PITTSBURGH	3.15 "	12.50 "	12.45 P. M.	7.50 "	7.50 "
SLAVERSVILLE BRANCH	6.03 "	"	2.49 "	9.54 "	9.54 "
JOHNSTOWN	6.56 "	"	3.37 "	10.42 "	10.42 "
CRESSON	7.58 "	"	4.38 "	11.43 "	11.43 "
ALTOONA	9.05 "	"	5.45 "	12.35 A. M.	12.35 A. M.
HUNTINGDON	10.31 "	8.40 "	7.04 "	1.45 "	1.45 "
LEWISTOWN	11.44 "	"	8.23 "	2.59 "	2.59 "
HARRISBURG	2.10 A. M.	8.33 "	10.45 "	5.30 "	5.30 "
LANCASTER	3.40 "	P. M.	12.15 A. M.	7.00 "	7.00 "
DOWNTOWN	5.00 "	"	1.40 "	8.16 "	8.16 "
ARRIVE:					
PHILADELPHIA	6.30 "	12.30 "	3.10 "	9.40 "	9.40 "
NEW YORK, via PHILADELPHIA	10.41 "	"	6.43 "	1.00 P. M.	1.00 P. M.
NEW YORK, via ALLENTOWN	"	"	3.50 "	12.05 P. M.	12.05 P. M.
BALTIMORE	"	"	12.10 "	4.30 "	4.30 "
WASHINGTON	"	"	3.40 "	5.50 "	5.50 "
BOSTON	9.00 P. M.	5.50 A. M.	6.05 P. M.	11.50 "	11.50 "

BOSTON AND NEW ENGLAND PASSENGERS will find this Route especially Desirable, as it Gives them an opportunity of Seeing the FINEST VIEWS AMONG THE ALLEGHANY MOUNTAINS,

Besides Visiting PITTSBURGH, PHILADELPHIA and NEW YORK, without extra cost!

All New England Passengers holding Through Tickets, will be Transferred, with their Baggage, to Rail and Boat Connections in NEW YORK, WITHOUT CHANGE.

Close Connections Made at Lima for all Points on the Dayton &amp; Mich. and Cin., Hamilton &amp; Dayton R'ys,

And at CRESTLINE, for CLEVELAND, ERIE, DUNKIRK, BUFFALO, NIAGARA FALLS, and all Points reached via Lake Shore R. R.

THROUGH TICKETS for sale at the Company's Offices, at 65 Clark St., and also at 52 Clark St.; cor. Randolph and Wells St.; at N. E. corner of Randolph and LaSalle Sts.; and at Depot, Chicago. Also at Principal Ticket Offices in the West.

F. B. MYERS, Gen. Pass. and Ticket Agt, P. &amp; F. W. R'y, Chicago.

W. C. OLELAND, Gen. Western Pass. Agt, P. Ft. W. &amp; C. R'y, Chicago.

T. L. KIMBALL, Gen. Western Pass. Agent, Penn. Central R. R., Chicago.

J. H. LINVILLE, PRESIDENT. J. L. PIPER, GEN. MANAGER. A. G. SHUFFLER, Supt. &amp; Treas.

The Keystone Bridge Company  
OF PITTSBURGH, PENN.

Office and Works, 9th Ward, Pittsburgh, Pa.

Philadelphia Office, 426 Walnut Street.

GENERAL WESTERN OFFICE:—13 Fullerton Block, 94 Dearborn St.,  
CHICAGO, ILL.

This Company possesses unrivaled facilities for manufacturing and erecting every description of Iron and Wooden Railway and Road Bridges, Roofs, Turn-Tables and Buildings, "Linville and Piper" Patent Iron Bridges, Self-Sustaining Pivot Bridges, Suspension Bridges, and Ornamental Park Bridges. Contractors for Wooden or Iron Bridges of any pattern, as per plans and specifications. Circulars sent on application.

WALTER KATTE, ENGINEER.

A. D. CHERBY, SECRETARY.

PITTSBURGH CAST STEEL SPRING WORKS.

A. French &amp; Co.,

Manufacturers of Extra Tempered, Light Elliptic

CAST STEEL SPRINGS,

FOR RAILROAD CARS AND LOCOMOTIVES,

FROM BEST CAST STEEL.

OFFICE AND WORKS:—Cor. Liberty and 21st Sts., PITTSBURGH, PA.

CHICAGO BRANCH, 88 Michigan Ave.

Broad Gauge! Double Track!  
ERIE RAILWAY.4 EXPRESS TRAINS DAILY!  
From Cleveland, Dunkirk and Buffalo, 625 Miles, to New York, WITHOUT CHANGE of Coaches!

The Trains of this Railway are run in DIRECT CONNECTION WITH ALL WESTERN AND SOUTHERN LINES, for

Elmira, Williamsport, Oswego, Great Bend, Scranton, Newburgh,

NEW YORK, ALBANY, BOSTON, PROVIDENCE,  
AND PRINCIPAL NEW ENGLAND CITIES.New and Improved DRAWING ROOM COACHES are attached to the DAY EXPRESS  
Running THROUGH TO NEW YORK.

SLEEPING COACHES, Combining all Modern Improvements, with perfect Ventilation and the peculiar arrangements for the comfort of Passengers incident to the BROAD GAUGE, accompany all night trains to New York.

CONNECTIONS CERTAIN! as Trains on this Railway will, when necessary, wait from one to two hours for Western trains.

All Trains of Saturday run directly Through to New York.

Ask for Tickets via Erie Railway, which can be procured at 66 Clark Street, Chicago, and at all Principal Ticket offices in the West and Southwest.

L. D. RUCKER, A. J. DAY, WM. R. BARR,  
Gen'l Superintendent, New York. | Western Passenger Agent, Chicago. | Gen'l Passenger Agent, New York



# LAKE SHORE — AND — MICHIGAN SOUTHERN R.W.

THE GREAT THROUGH LINE BETWEEN  
**CHICAGO, BUFFALO & NEW YORK,**  
WITHOUT CHANGE!

AND THE ONLY RAILWAY

RUNNING PALACE COACHES THROUGH!  
— BETWEEN —

**CHICAGO & NEW YORK, via BUFFALO**  
WITHOUT TRANSFER OF PASSENGERS!

All Trains Stop at Twenty-Second Street to Take and Leave Passengers.  
Baggage Checked at that Station for all Points East.

**4 EXPRESS TRAINS DAILY**, [Sundays Excepted,] Leave  
CHICAGO from the New Depot, on Van Buren St., at the head of La Salle Street, as follows

**7:30 A. M. MAIL TRAIN.**  
VIA OLD ROAD AND AIR LINE. SUNDAYS EXCEPTED.

Leaves 221 Street 7:45 A. M. Stops at all Stations. Arrives—Toledo, 8:20 P. M.

**11:30 A. M. SPECIAL NEW YORK EXPRESS,**  
— A AIR LINE. SUNDAYS EXCEPTED.

Leaves—Twenty-Second Street, 11:45 A. M. Arrives—Elkhart, 2:55 P. M.; Cleveland 10:40 P. M.; Buffalo, 4:10 A. M.; New York, 5:30 P. M.; (Chicago Time) Boston, 11:45 P. M.

This Train has **PALACE SLEEPING COACH** Attached, Running  
**THROUGH TO ROCHESTER, WITHOUT CHANGE!**

IN DIRECT CONNECTION WITH

Wagner's Celebrated Drawing-Room Coaches on N. Y. Central R. R.

Only Thirty Hours, Chicago to New York!

**5:15 P. M. ATLANTIC EXPRESS (Daily),**  
VIA OLD ROAD.

Leave—Twenty-Second Street 5:30 P. M. Arrives—Laporte, 8:10 P. M. (Stops 20 minutes or Supper); arrives at Toledo, 2:50 A. M.; Cleveland, 7:25 A. M. (30 minutes for Breakfast); arrives at Buffalo, 1:50 P. M.; Rochester, 5:10 P. M. (30 minutes for Supper); connects with **Sleeping Coach** running Through from Rochester to Boston Without Change, making but One Change between Chicago and Boston.

NEW AND ELEGANT SLEEPING COACH Attached to this Train, Running  
THROUGH from CHICAGO TO NEW YORK WITHOUT CHANGE! Arrives  
at NEW YORK, 6:40 A. M.

**9:00 P. M. NIGHT EXPRESS**  
VIA AIR LINE. (DAILY EXCEPT SAT. & SUN.)

Leaves—Twenty-Second Street, 9:15 P. M. Arrives—Toledo, 6:00 A. M. (30 minutes for Breakfast); arrives at Cleveland, 10:35 A. M.; Buffalo, 5:30 P. M.; New York, 11:00 A. M.; Boston, 3:50 P. M.

## KALAMAZOO DIVISION.

Leave Chicago 11:30 A. M. Arrive at Kalamazoo 5:30 P. M.;  
Grand Rapids, 8:15 P. M.

Leave Chicago 9:00 P. M. Arrive at Kalamazoo 7:10 A. M.;  
Grand Rapids, 10:20 A. M.

Elkhart Accommodation leaves Chicago, 3:30 P. M. Arrives  
at Elkhart, 8:20 P. M.

There being no heavy grades to overcome, or mountains to cross, the road bed  
and track being the smoothest and most perfect of any railway in the United States, this Company run  
their trains at a high rate of speed with perfect safety.

Travelers who wish to SAVE TIME and make SURE CONNECTIONS,  
purchase Tickets via

**LAKE SHORE & MICHIGAN SOUTHERN R'Y.**

THE ONLY LINE RUNNING THROUGH BETWEEN CHICAGO AND  
BUFFALO, WITHOUT TRANSFER, and in Direct Connection with NEW YORK  
CENTRAL RAILROAD and ERIE RAILWAY.

General Ticket Office for Chicago, No. 56 Clark Street.

**CHAS. F. HATCH,**  
General Superintendent, CLEVELAND, OHIO

**F. E. MORSE,**  
General Western Passenger Agent, CHICAGO.

# ILLINOIS CENTRAL RAILROAD.

PASSENGER TRAINS LEAVE CHICAGO FROM THE GREAT CENTRAL DEPOT, FOOT OF LAKE ST

**ST. LOUIS AND CHICAGO**  
THROUGH LINE.

**9:30 A. M. DAY EXPRESS** Sundays Ex  
Arriving in ST. LOUIS at 10:15 P. M.

This Train Reaches St. Louis ONE HOUR & FIFTEEN MINUTES in Advance of any other Route!

**8:30 P. M. FAST LINE.** Saturdays Excepted.  
Arriving at ST. LOUIS at 8:00 A. M.

AT ST. LOUIS, Direct Connections are Made FOR

Jefferson City, Sedalia, Pleasant Hill, Macon, Kansas City,  
**LEAVENWORTH, ST. JOSEPH & ATCHISON,**

—Connecting at KANSAS CITY for—

LAWRENCE, TOPEKA, JUNCTION CITY, SALINA, SHERIDAN, &c.

**CAIRO, MEMPHIS AND NEW ORLEANS LINE.**

**9:30 A. M. CAIRO MAIL,** Sundays Excepted.  
Arriving at Cairo 2:21 A. M., Memphis 12:40 P. M., Mobile 9:40 A. M.  
Vicksburg 9:30 A. M., New Orleans 11:10 A. M.

**8:30 P. M. CAIRO EXPRESS,** Except Saturdays.  
Arriving at Cairo 3:15 P. M., Memphis 3:30 A. M., Vicksburg 5:00 P. M., New Orleans 1:30 A. M.

**4:55 P. M. CHAMPAIGN PASSENGER,**  
Arriving at Champaign at 11:15 P. M.

THIS IS THE ONLY DIRECT ROUTE TO

Humboldt, Corinth, Grand Junction, Little Rock, Selma, Canton  
Grenada, Columbus, Meridian, Enterprise,

**MEMPHIS, VICKSBURG, NEW ORLEANS & MOBILE.**

At NEW ORLEANS, connections are made for

**GALVESTON, INDIANOLA,**

And all Parts of Texas.

NOTICE.—This Route is from 100 to 150 MILES SHORTER, and from  
12 to 24 HOURS QUICKER than any other.

THIS IS ALSO THE ONLY DIRECT ROUTE TO

**DECATUR, TERRE HAUTE, VINCENNES & EVANSVILLE.**

**Peoria and Keokuk Line.**

**9:30 A. M. KEOKUK PASSENGER,** Sun. Excepted.  
Arriving at Chenoa 3:15 P. M., El Paso 4:05 P. M., Peoria 5:40 P. M.,  
Canton 7:14 P. M., Bushnell 8:50 P. M., Keokuk 11:30 P. M., Warsaw 12:05 A. M.

**Elegant Drawing Room Sleeping Cars**

ATTACHED TO ALL NIGHT TRAINS.

**Spacious and Fine Saloon Cars!**

WITH ALL MODERN IMPROVEMENTS, RUN UPON ALL TRAINS.

BAGGAGE CHECKED THROUGH TO ALL IMPORTANT POINTS.

For Through Tickets, Sleeping Car Berths, Baggage Checks, and information, apply at the office  
of the Company in the Great Central Depot, foot of Lake St.

**Hyde Park and Oakwoods Train.**

HYDE PARK TRAIN	LEAVE	ARRIVE	HYDE PARK TRAIN	LEAVE	ARRIVE
HYDE PARK TRAIN	*8:30 A. M.	*7:45 A. M.	HYDE PARK TRAIN	*8:00 P. M.	*6:15 P. M.
HYDE PARK TRAIN	*8:00 A. M.	*9:15 A. M.	HYDE PARK TRAIN	*6:10 P. M.	*7:25 P. M.
HYDE PARK TRAIN	*12:10 P. M.	*1:30 P. M.			

\* Sundays Excepted.

W. P. JOHNSON, Gen. Pass. Agent.

M. HUGHITT, Gen. Supt.



# 1870. Great Central Route! 1870.

## SPEED! COMFORT! SAFETY!

# MICHIGAN CENTRAL and GREAT WESTERN RAILWAYS!

The Great Central Route, via Niagara Falls, to

## NEW YORK AND NEW ENGLAND.

### Pullman's Magnificent Palace Drawing-Room Cars,

— FROM —

### CHICAGO TO NEW YORK CITY, WITHOUT CHANGE.

#### 4 PASSENGER TRAINS LEAVE CHICAGO, DAILY EXCEPT SUNDAY.

(DEPOT, FOOT OF LAKE STREET,) as Follows:

#### 5:00 A. M. MAIL TRAIN. Stops at all Stations.

(SUNDAYS EXCEPTED.)

Arrives DETROIT at 5:40 P. M.

#### 11:30 A. M. SPECIAL NEW YORK & BOSTON EXP.

(SUNDAYS EXCEPTED.) Arrives at Michigan City 1:13 P. M.; New Buffalo 1:33; Niles 2:15 (Dinner); Kalamazoo 3:33 P. M.; Battle Creek 4:33; Marshall 4:43; Jackson 5:43; Detroit 7:53; London 12:06 A. M.; Hamilton 2:33 A. M.; Toronto 9:30; Suspension Bridge 3:53; Rochester 7:00 A. M.; Albany, 2:00 P. M.; NEW YORK, 6:25; BOSTON, 11:50 P. M. This train connects at ROCHESTER (7:00 A. M.) with

#### Wagner's Magnificent Palace Drawing-Room Cars!

RUNNING THROUGH TO NEW YORK, WITHOUT CHANGE!

#### 5:15 P. M. ATLANTIC EXPRESS.

(DAILY.) Arrives at Michigan City, 7:13 P. M.; Niles 8:30 P. M. (Supper); Kalamazoo, 10:35 P. M.; Jackson, 1:00 A. M.; Detroit 3:40; London, 8:35 (Breakfast); Hamilton 11:40; Suspension Bridge 1:30 P. M.; Rochester 5:00 P. M.; Albany, 1:30 A. M.; NEW YORK, 6:40 A. M.; BOSTON, 11:00 A. M. A MAGNIFICENT DRAWING-ROOM SLEEPING CAR is attached to this train daily, FROM CHICAGO TO NEW YORK CITY. The celebrated

Hotel Drawing-Room Car is also attached to this Train from Chicago to Rochester!

These, together with ELEGANT DAY CARS TO SUSPENSION BRIDGE, make this Train the favorite Train for all points East.

**SPECIAL NOTICE.**—Boston and New England Passengers will please notice that this Train now makes direct connection through. A SLEEPING CAR is attached at Rochester at 5:20 P. M., running through to Springfield, Mass., thus avoiding transfer at Albany. Breakfast at Springfield. This Train reaches Springfield early enough second morning to Connect with all Trains up and down the Connecticut.

#### 9:00 P. M. NIGHT EXPRESS.

(SAT. & SUN. EXCEPTED.) Arrives at Michigan City, 11:03 P. M.; Niles, 12:25 A. M.; Kalamazoo, 2:00; Marshall, 3:13; Jackson, 4:25; Grand Trunk Junction, 7:00; Detroit, 7:30; London, 1:45 P. M.; Hamilton, 4:35; Toronto, 9:35; Niagara Falls, 6:15; Buffalo, 7:15 P. M.; Rochester, 9:10; Syracuse, 12:25 A. M.; Rome, 1:55; Utica, 2:25; Albany, 6:30 A. M.; NEW YORK, 10:00 A. M.; BOSTON, 3:40 P. M.

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#### 4:30 P. M. AFTERNOON EXPRESS.

(EXCEPT SATURDAY)

Arriving at Michigan City 8:30 P. M. (Supper); LaFayette, 11:30 P. M.; Indianapolis, 2:15 A. M.; Louisville, 7:00 A. M.; Nashville, 4:00 P. M.

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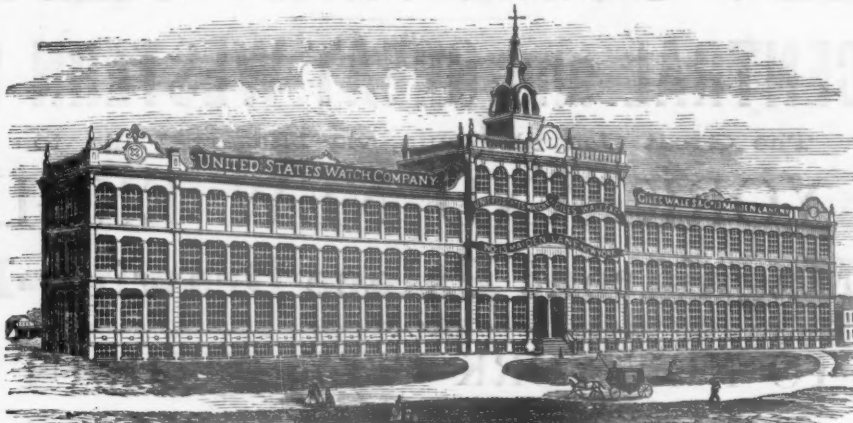
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WATCH No. 1139, bearing Trade Mark, "Frederic Atherton & Co., Marion, New Jersey," manufactured by United States Watch Co., bought of you, is giving perfect satisfaction, its variation from mean time being imperceptible.  
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WALTER R. GREEN,  
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WATCH No. 2248, bearing Trade Mark, "Fayette Stratton," manufactured by the United States Watch Co., has been carried by me one year, its total variation from mean time being only a trifle, and its performance has been entirely satisfactory, being by all odds the most accurate time-keeper I have ever carried.  
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W. H. HAWKINS,  
Chicago, Bur. & Quincy Railroad.

The watch bought of you has been carried by me eighteen months, its total variation from mean time being scarcely perceptible.  
Yours truly,  
J. MCGREGOR ADAMS,  
Crerar, Adams & Co., Chicago.

The Three Stem Winding Gold Watches purchased of you for my daughters and their friend, have proved very close time keepers and given entire satisfaction.  
J. L. PICKARD,  
Supt. Public Instruction, Chicago.

WATCH No. 1471, bearing Trade Mark, "Frederic Atherton & Co., Marion, New Jersey," manufactured by the United States Watch Co., has been carried by me nearly two years, its total variation from mean time being only about one minute a year.  
GEO. M. BOGUE,  
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WATCH No. 2798, bearing Trade Mark, "Fayette Stratton, Marion, New Jersey," manufactured by United States Watch Co., has been carried by me six months, its total variation from mean time being only six seconds.  
JOHN M. WOOLHOUSE,  
Conductor C. & N. W. R'y, Chicago.

STEM WINDING WATCH No. 1235, bearing Trade Mark, "Frederic Atherton & Co., Marion, New Jersey," manufactured by the United States Watch Co., has been carried by me one year, its total variation from mean time being only two seconds a month. The watch is by far the best watch I have ever carried or handled.  
J. F. WARREN,  
Of J. F. Warren & Co., 173 Randolph-st., Chicago.

DES MOINES, July 21, 1870.  
Messrs. GILES, Bro. & Co.  
I take pleasure in saying that the watch I bought of you, being No. 2174, "Fayette Stratton, Marion, New Jersey," made by the United States Watch Co., has given me perfect satisfaction, its total variation from mean time, since regulated, being scarcely perceptible. Yours, etc.,  
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